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REPORT

OF THE

COMMISSIONER OF PATENTS,

FOR THE YEAR 1850.

PART II.

AGRICULTURE.

Contents.

I.—REVIEW OF PRINCIPAL CROPS.
II.—STUDY OF SOILS.
III.—FRUIT CULTURE.
IV.—SHEEP HUSBANDRY.
V.—COMMUNICATIONS.
VI.—METEOROLOGICAL TABLES.
VII.—STATISTICAL INFORMATION.

WASHINGTON:
OFFICE OF PRINTERS TO HOUSE OF REPS.
1851.

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" James M. Bailey, St. Croix county, Wis.
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" Mordecai Lottridge, Saratoga, N. Y.
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" Lewis C. Gaines, (no residence nor date.)
" John J. Hagaman, Seneca county, N. Y.
" John B. C. Gazzo, (without date or residence.)
" Chas. F. Ingals, Sacramento city, Cal.
" John N. Rottiers, Jefferson county, N. Y.

In connection with the foregoing list of communications, it should be stated that some hundreds have been noticed under the heads of "Review of Crops," "Rearing Domestic Animals," and elsewhere. Many letters arrive at so late a period that it is impossible to get them copied and arranged ready for the press in season for the Report of 1850. The best of such will appear in that for 1851. It was expected that a large share of the agricultural statistics of the U. S. Census of 1850 might appear in this volume; but statistics relating to population being first prepared for the press at the Census Office, those relating to agriculture are unavoidably deferred.

REVIEW

OF

THE PRINCIPAL CROPS GROWN IN 1850.

WHEAT.

The circular issued from the Patent Office contains the following questions in reference to wheat: "Varieties in use? Average product per acre? Time of seeding and of harvesting? Preparation of seed, and quantity used per acre? How many times and how deep do you plough? Is the yield per acre increasing or diminishing? What is your system of rotation of crops? What the best remedies for Hessian flies and weevils? The average price of wheat at your nearest market?"

The answers to the first question show that from fifteen to twenty varieties of winter wheat and six or eight of spring wheat are cultivated in the United States at this time. These include not the whole, but the kinds most in favor with wheat-growers in all parts of this extended republic. A variety called Mediterranean is particularly commended for its early maturity and hardiness, and consequent exemption in an unusual degree from injury by rust and insects. It is, however, a cereal of inferior quality, and little cultivated in the best wheat-growing districts, because millers much prefer white wheats that yield whiter and more saleable flour. So far as gluten and strength of staple are concerned, the flour made from Mediterranean wheat is probably equal to the best produced under similar circumstances; but the intrinsic value of flour for nutrition has very little influence on the market price of the article. Seeds that contain a large per cent. of starch, which is whiter than gluten, and have a white and thin cuticle or bran, are uniformly preferred by millers. Such grain yields the maximum of superfine flour. The wheat plant is attacked by so many insect depredators and parasite fungi, and is subject to so many casualties from frosts in winter and spring, from sudden alternations of wet and dry weather, defective soils and bad tillage, that the more delicate varieties are not popular among the mass of farmers. In western New York, Pennsylvania, Ohio, Michigan, Wisconsin, northern Illinois, Indiana, and Iowa, the most extensive growers of wheat prefer the improved white flint, Soules, bald and bearded red chaff, Hutchinson, Talavera, bluestem, and other kinds similar in character, but known by local names. At the south, Virginia May wheat and the Mediterranean are perhaps the most popular, although the above-named varieties are also cultivated. In New England, spring wheat is grown much more than winter grain. The kinds usually cultivated are tea spring wheat, Italian, Black Sea, red chaff, club wheat, Whintington, Canada, and others known by mere provincial names. Mr. Moses Newell, of West Newbury, Mass., says that "little spring wheat has been sown here for four or five years, because the insects have nearly destroyed the crop.

The kinds in use here have been the red, the Black Sea, the tea, and the white bald." He adds: "Winter wheat, sown in August and September, is beginning to take the place of spring wheat. Upon some lots in this vicinity nearly 40 bushels per acre have been obtained; and 20 bushels are not above an average crop. It has succeeded well upon sward land turned over, applying compost manure spread on the sod after ploughing, and immediately sowed and harrowed. In some instances the seed has been covered by a light one-horse plough, in some by a cultivator, but more generally by the common harrow. The plough or cultivator is preferable to the common harrow, as it covers the seed deeper, and renders the young plants less liable to injury from frost. August sowing has given the best crops, other things being equal." In regard to the use of compost manure, guano, and other fertilizers applied at the time of seeding, the practice is gaining favor in all districts where the soil is somewhat impoverished by previous cropping, or naturally not well adapted to wheat culture. A compost consisting of well rotted stable manure, wood ashes, gypsum, and a little common salt, is preferred. Mr. W. Fisher, of Franklin, Mass., says that the Black Sea variety is most cultivated in that section; but owing to a lack of mills for grinding and other causes, little attention is paid to the production of this grain. Mr. Joshua Smith, of Hanson, in the same State, informs us that the legislature, some fifteen years since, paid a bounty on wheat; but the business proved unprofitable. The crop is now much neglected, and the bounty discontinued. Mr. Elisha Edwards, of Southampton, says that the white flint is found to be the most profitable wheat for autumn seeding. Of this kind he has raised 24 bushels per acre; but it was an extraordinary crop. About 12 bushels is the average yield. He prepares seed by "soaking three days in strong brine; pour off the liquid, and roll in as much air-slaked lime or plaster as the moist seed will receive, to make it fit for sowing. Time of seeding, early part of October; use two bushels of seed per acre; plough first in June, six inches deep; cross-plough the last of September. Not troubled with insects; average price $1 33 a bushel." [Our correspondent soaks his seed too long in a "strong brine," and runs a great risk of destroying its vitality altogether. Five or six hours are quite long enough to keep seed wheat in any steep. It imbibes too much salt, which injures the growth of the plant for months after the wheat comes up, if the seed be long kept in strong brine, as the writer has found by experience.—Ed.]

Mr. Cyrus Holbrook, of Worcester, says that the average yield of spring wheat in that county is from 17 to 20 bushels per acre; amount of seed sown 1¾ bushel; time of seeding, middle of April; time of harvesting, second week in August; plough twice; wash and lime seed; price of wheat, $1 25 a bushel.

Mr. Thomas Lincoln, of Washington county, Maine, writes that "spring wheat is almost exclusively raised; varieties, bald and Black Sea. Winter wheat has been tried in a few instances lately, and succeeded so well as to increase the culture of this crop. Annual product per acre about 17 bushels." Mr. L. prefers to sow on land planted and manured the previous year; if greensward is used, the manure is spread before breaking, and is ploughed in spring; grain is sown about the 1st of May, at the rate of 1½ bushel per acre. The yield has diminished on the whole for a good many years "Crop of late years much troubled with rust. Black

Sea wheat is exempt from this malady, and is least injured by insects. Have never had the Hessian fly, and seldom the weevil, in grain. Within seven or eight years we have in some instances lost a large part of the crop by an insect called here the 'wheat fly,' [probably the *cecidomyia tritici*,] which deposites its eggs on the end of each grain just after the blossoming, and stops the growth of the kernel by sucking its juices without gnawing it like the weevil. Average price $1 50 a bushel." Mr. J. S. Keith, of Oxford county, Maine, writes: "The average yield of spring wheat in this county for seven years past has not been above seven or eight bushels to the acre." "Winter wheat is being introduced into several counties with success." "Seed is soaked in brine from 48 hours to four days; best farmers have abandoned fall ploughing, and plough all they can in spring—the more the better, till the surface becomes light and porous."

Mr. Elijah Burrell, of Greene, in the same State, says: "In this vicinity the culture of spring wheat has been for three years past nearly abandoned, owing to the ravages of the weevil, although in 1849 and 1850 wheat sown on light land produced well and sustained but little injury from the fly. Red bearded wheat is preferred, producing from 10 to 25 bushels per acre. Time of seeding from 10th to 20th May. Seed usually washed or soaked in brine, and rolled in lime to prevent smut. Quantity of seed from one to two bushels per acre. The crop is usually followed by corn. Wheat, corn, clover or timothy are grown in succession. Winter wheat is sown in August on a greensward fallowed. On land manured before breaking the sod, 30 bushels are sometimes harvested from an acre." Mr. Pruinton, of Portland, estimates "the average product per acre at about 35 bushels" in Cumberland county. His attention, probably, has been directed mainly to the crops of good farmers who make their lands rich by manure or clover, and cultivate their wheat fields in a superior manner. He says that "seeding takes place about the 25th of August; harvesting the 1st of July." Very little wheat is cut so early as the 1st of July so far north as Portland, we imagine. On light, warm land, well manured, wheat will ripen from 10 to 20 days earlier than on poor, heavy, cold soils. This fact is worthy of consideration by wheat-growers in Maine and all the States where rust and insects attack the crop as it approaches maturity. One soil in the same field may be ten degrees warmer than another; and if so, the warmer earth will advance vegetation or growing wheat plants as much in 90 days as the colder in 100. The study of the temperature of soils and of the atmosphere just above the earth is too much neglected in all parts of the United States. Mr. Pruinton adds on the subject of wheat culture: "Old ground should be ploughed twice, deep, with a subsoil plough. The yield per acre is increasing; spring sowing is going out of practice. Spring wheat is subject to blight and Hessian fly. The average price in Portland of wheat is $1 40 a bushel." Mr. W. D. Dana, of Washington, says: "Wheat, which for a few years past has almost ceased to be cultivated on account of the ravages of the wheat fly, has this year proved remarkably good.

"The fly has left these parts; none having been seen this year, so far as I can learn, either in this State or the neighboring provinces of New Brunswick and Nova Scotia. The Black Sea wheat is almost the only variety in use—average product, 15 bushels per acre. Time of seeding, from April 20 to May 20; of harvesting, from 20th to 30th August. I

prefer to cut it before the grain is hard, and let it ripen in the stook. Winter wheat is beginning to be cultivated as an experiment, and promises to become profitable. The preparation of seed usually practised here is to put it into a strong brine, and skim off what floats; then mix lime sufficient to dry it. I have never known *smut* where this course has been adopted. We sow 1½ bushel per acre. Hessian fly and weevil not known. The wheat fly does its mischief in the growing grain, for which we have no remedy but either early or late sowing—hoping that one or the other will escape. Price, $1 50 a bushel."

In Somerset county, as Mr. Edward Rowe informs us, the spring wheats most cultivated are a bald white chaff, called tea wheat, and a bearded red chaff, known as Malaga wheat. Owing to the depredations of the Hessian fly and weevil, and injury from rust, the growing of wheat has been nearly abandoned for a few years; but the harvests of 1850 were more encouraging. Amount of seed, 1½ to 2 bushels per acre; harvest last of August or first of September. The growing of winter wheat is beginning to attract considerable attention. From reliable sources, information has been obtained that more than 10,000 bushels have been grown in 1850 in the two counties of Somerset and Kennebec, nearly all of which is sown for another crop; kinds in use are white flint, Kloss or banner, and Oregon. Sown in September, 1 bushel per acre; yield this season, 25 bushels per acre. Mode of culture: ground well ploughed once, harrowed fine and smooth, seed sown and covered with a small plough. Price this season, $2 to $2 50 a bushel; price of spring wheat, $1 25 to $1 50. Mr. Elijah B. Stackpole, of Penobscot county, writes that the crop of wheat is better in that county than usual; insects not so troublesome, and the average yield of spring wheat 15 bushels per acre. Time of seeding, middle of May; of harvesting, the last of August. Plough twice—first in autumn, six or eight inches deep, and again in spring.

Mr. John D. Lang, of Kennebec, writes that wheat he imported from Poland yields from 20 to 30 bushels per acre; this is a winter wheat. Black Sea and bald yield from 16 to 20 bushels. Winter wheat is sown from the 20th to 30th August; harvested from the 20th to 30th of July. Spring wheat is sown from 20th to 30th May, and harvested about the 1st September. Mr. L. ploughs greensward from 10 to 12 inches deep the first time; and in stead of harrowing for winter wheat, the seed is ploughed in 3 or 4 inches deep, and not harrowed afterwards. Lime and plaster are applied to wet seed before sowing, which has been washed in simple water to free it from foreign and imperfect seed. For spring wheat, the ground is ploughed about 10 inches deep, and the seed harrowed in. The most successful dressing for winter wheat is a crop of clover turned under with the plough; in default of that, a compost of leached ashes, salt, and lime, spread evenly over the field. By sowing spring wheat on or after the 20th of May, the ravages of the Hessian fly and weevil are avoided. Rust sometimes affects late sown wheat, except the Black Sea variety. Mr. L. has sown as late as the 10th of June with good success. Wheat generally sells at $1 20 per bushel; seed wheat at $2. Mr. Ezekiel Combs, of Upperfreehold, Monmouth county, New Jersey, informs us that Mediterranean wheat is most extensively cultivated in that county, being less liable to rust and smut than other varieties. The next in public esteem is the Genesee wheat, which he

regards as most prolific on rich, heavy land. The red chaff is cultivated to a limited extent, and is considered best for late seeding, on a moist soil. Average yield per acre, 12 bushels; time of seeding, between September 25 and October 10. Mediterranean should be sown a little earlier than other kinds of wheat; early sown wheat, however, is frequently attacked by the Hessian fly and yellows, while late sown suffers more from the fly in the spring, winter and spring frosts, and rust. Mr. C. calls attention to the well-known importance of letting seed wheat stand till fully ripe before it is cut, and thinks that wheat shrinks somewhat in weight by harvesting before maturity. He regards washing in strong brine and liming as a positive preventive against smut. White wheat, he sows from 1½ to 2 bushels per acre; Mediterranean, 2 to 2½ bushels; with Pennock's drill, 1 to 1½ of white and 1½ to 1¾ of Mediterranean are sufficient. Plough deep; which is followed by a regular increase of product. Price, $1 10 a bushel.

Mr. Andrew Watterson, of Beaver, Pennsylvania, writes that the yield per acre of wheat in that region is increasing. Time of seeding, from 10th to 25th of September; harvesting, from the 4th to the 20th July. One ploughing is preferred, a little deeper each time. On land in good state of cultivation, a second crop is immediately taken after the first; then seed with timothy or clover. On poor land a crop of oats succeeds wheat; and sow clover. Price, at the nearest market, 75 cents. Mr. Orange Johnson, of Franklin county, Ohio, informs us that there is very little variation in the yield of wheat in that section. He ploughs twice, not deep, sows 2 bushels to the acre, and gets about 20 as an average crop. He changes from wheat to corn and from corn to wheat; is not troubled with flies or weevils, and obtains at the nearest market 62 cents a bushel for wheat.

Mr. Peter Fruttchey, of Northampton, Pennsylvania, says that Whitehall, bluestem, and Mediterranean wheats are most cultivated in that county; the first named is thought to yield the best, the crop being from 15 to 20 bushels per acre. Sow about the 15th September, and harvest near the 10th July. Plough three times about six inches deep. Yield per acre rather increasing of late. Wheat is generally sown on corn stubble; no preparation of seed except to have it clean. Price, $1 a bushel.

Mr. Jabez Bostwick, of Hamden, Delaware county, New York, says that since the appearance of the weevil, which destroys the berry of the head before it comes to maturity, we have nearly dispensed with the raising of either winter or spring wheat. The destruction of crops by the weevil within a year or two has not been experienced, and the growing of wheat is increasing. Winter wheat is sown in the latter part of August, on summer fallowed meadow or pasture land, and yields from 15 to 25 bushels per acre. If spring wheat is sown so late as the 15th of May, it will escape the weevil; the egg-hatching season of that insect having passed by before the heads are sufficiently developed for the support of its larvæ, but in common seasons the rust is very apt to attack late wheat. The white bearded is considered the best. Mr. B. sows 1¾ bushel per acre.

Mr. Peter S. Reist, of Lancaster county, Pennsylvania, says that is a great wheat county—not because it brings sure crops, but on account of the great number of industrious people engaged in growing wheat as a staple production. We raise, as an average crop, from 20 to 25 bushels

per acre; and not unfrequently harvest 30 bushels. Sometimes we fail to get the amount of seed sown, from the effects of Hessian flies, rust, and winter-killing. For insects and rust we know of no remedy. Late seeding keeps the flies off in the fall, but they often attack the crop in the spring, while rust and frost are usually more severe on late than early sown grain. Average price, $1 a bushel. Mediterranean and bluestem are most cultivated. A correspondent, who signs "L. S. R., Warwick," in the same county, says that the Mediterranean wheat is more cultivated than any other, because it ripens earlier, and is less subject to mildew and rust. The Hessian fly rarely, if ever, attacks or injures it. The red bluestem is a fine wheat, and much cultivated in the county, but it is a great favorite with the flies. The same is true of the white bluestem, which is even less successfully grown than the red variety. Average product about 15 bushels.

Mr. George Craft, of Brownsville, Fayette county, Pennsylvania, writes there was almost an entire failure of the wheat crop, except the Mediterranean, in 1850; owing, as I believe, to some two or three days of intensely hot weather about the 22d of June, when the berry was filling, or making. Many contend that the rust destroyed the crop, when there was in fact no rust upon it. The smooth Mediterranean is a white wheat with large grains, yields well, and weighs 64 pounds per bushel. Average crop from 15 to 20 bushels per acre. Sowing is done from September 20 to October 10; harvest begins about the 25th June; seed thoroughly cleaned, and sown at the rate of 1½ bushel per acre. On fallow ground plough and harrow twice; first ploughing from 6 to 8 inches deep. Lime is much used as a fertilizer.

Mr. Charles Ruggles, of West Vermilion, Ohio, who resides in a wheat-growing region, has the following sensible remarks on the production of this staple:

"The varieties most in use are the white kinds—such as the Soules, Hutchinson, Crate, white flint, &c., with some Illinois and Mediterranean. There is but little of the latter, as it is a poor variety, a little superior to rye in quality, while the yield is good. The average product per acre in this vicinity is 20 bushels. This year it has gone far above that. Taking one tier of farms on the lake shore, six miles in extent, 543 acres were sown, from which 20,317 bushels were harvested and *measured*, being an average of 27½ bushels per acre. Little or no pains are taken in the preparation of seed, further than to clean it well. On strong lands, 2 bushels are sown per acre; the usual amount, 1½.

"Summer fallows are not often ploughed more than twice, and from 5 to 7 inches deep; but a few run a second plough in the furrow made by the first, and the two turn the soil from 12 to 15 inches. The result is *one-third more wheat per acre*. I think the yield is steadily on the increase. But little system of rotation of crops is observed—many sowing wheat after wheat for several years in succession, until the ground becomes so foul that it will no longer bear grain fit for market. It is then seeded to clover and timothy, and kept in meadow a year or two, or till it will do to undergo another series of cropping.

"This, however, is not done by good farmers. A great deal of wheat is grown after corn. The ground is well manured, ploughed deep, and the corn cut up at the root so soon as it is ripe enough for that purpose, and the ground well ploughed and sown immediately. This, when well

done, gives a good crop, and is profitable; but the practice demands more manure than summer fallow. I know of no remedy for the Hessian fly, only to sow early and prepare the ground well."

The idea of Mr. R , doubtless, is not to escape the fly in autumn, but to have the wheat plants so vigorous that its larvæ can do but little injury. If this view of the case be correct, and sustained by experience, then early sown grain will have the additional advantage of standing winter freezing better, and of coming earlier to maturity in summer, and thereby escape injury from rust.

Mr. S. S. Boyd, of Jacksonburg, Wayne county, Indiana, writes that wheat has become a principal crop. It is oftener sown among corn than all other modes of seeding, when it yields about 12 bushels per acre. By breaking a fallow or clover field in June or July, ploughing again and sowing in September, harrowing in the grain, 25 bushels per acre are a common yield. The greatest enemy to wheat is rust: the Hessian fly and weevil are seldom feared in this county.

To avoid the rust, the earliest varieties are selected, and sown about the first of September, so that it may ripen as early as possible.

Mr. Henry Daggett, of New Haven, Oswego county, New York, says that it pays to plough corn ground twice, instead of once, in preparing it for seeding with wheat. It is quite subject to heave by frost, which often does great injury to the crop. Draining is the proper remedy for this evil.

Mr. F. D. Kingman, of Bergen, Genesee county, New York, says that his "crops of wheat for the last five years have averaged thirty two and a third bushels per acre." We commend this fact to the notice of those who have been led to believe that the "Genesee country" was failing to produce the great staple for which it has long been celebrated. Mr. K. has the following remarks on wheat culture:

"Time of seeding, from 1st to 16th September; of harvesting, from 20th to the last of July. Brine and lime seed, and sow 1¾ bushel per acre: sometimes I sow 2 bushels, but find it too thick. Plough three times: have this year procured one of Nourse & Mason's subsoil ploughs, and subsoiled a part of each wheat field. It takes three heavy horses to haul the surface plough 7 inches deep, which is my gauge. Subsoil with a yoke of oxen and a pair of horses, driving the plough 6 inches below the cut of the surface plough. The increase is from 8 to 10 bushels per acre. Within the last ten years, I have not been troubled with the Hessian fly but once. Price of wheat, from $1 to $1 12. At least one-third of my wheat is sown after spring crops, and clover always follows, being sown in April, at the rate of 10 pounds of seed per acre with 100 of plaster. I turn nothing into clover fields in the spring; and when it is half in blossom, turn under with the plough. I now raise too much straw, and feel the need of understanding chemistry to learn what to apply to increase the berry. We once had a chemist at Rochester (Dr. Lee) who would give the desired information, but I did not then know that it was needed by me. I have never kept any account of my corn crop, but it averages not far from 50 bushels per acre."

How to grow more wheat and less straw to the acre is a problem not so easily solved as some may suppose. If the enterprising farmers of western New York would maintain an experimental farm to test, in a thorough and satisfactory manner, the suggestions of chemical science, we have no

doubt that the same land and amount of labor now employed in wheat culture might give them a quarter more grain at each harvest, on an average. Time will work out this improvement, when more agriculturists discover, as Mr. Kingman has, that additional knowledge is desirable.

Mr. Loring K. Tyler, of Lee county, Virginia, writes that the average yield in that county does not exceed eight bushels per acre. Wheat brought from the north invariably does badly for seed; while the Mediterranean, brought from South Carolina, is succeeding well, after four years' trial. Time of sowing from 20th October to 10th November.

Mr. William Mulks, of Cold Spring, Jefferson county, Wisconsin, writes that the "wheat crop in this section of the State has been exceedingly light this year, both spring and winter grain; the decrease below last year is probably 40 per cent." The culture of spring wheat is increasing, owing to the failure of winter wheat. The last-named averages about twelve bushels, the former fourteen, per acre. Average price at Milwaukie, 75 cents a bushel.

Mr. G. De Neven, of Fond du Lac county, in the same State, says: "More winter wheat was sown in the autumn of 1849 than in previous years; but the yield was very poor, and of an inferior quality, owing to an exceedingly dry spring, cold winds, and continued rains during harvest. The average yield this year is about nine bushels per acre; last season about twenty. More spring wheat is grown this year than usual."

Mr. Ephraim Pickins, of Dodge county, Wisconsin, says that the average yield of wheat there is 15 bushels per acre, and that the crop is sadly injured by rust on low ground. Farmers are turning their attention to other crops, stock growing, &c. Wheat is sown from 5th to 25th September, and harvested from July 15th to 25th. Quantity of seed per acre, $1\frac{1}{4}$ bushel. Plough but once, six inches deep. Yield per acre diminishing.

Mr. James H. Gill, of Mount Pleasant, Ohio, after naming the varieties of wheat generally cultivated in that State, says that "defective crops originate from several causes: 1. The seed is thrashed by machines which break and injure the grain, so that it fails to germinate. 2. Seed harrowed in, leaves at least one-fifth on the surface, which never come to maturity, if they grow at all. 3. The want of proper draining. 4. Shallow ploughing, seldom going deeper than seven inches, and scarcely ever subsoil. Frequently we plough but once; but generally lose the crop, from the fact that blue grass takes possession of the ground and destroys the wheat. Our system of cropping is various; but the method of cropping should be—first, corn; second, oats or barley; third, wheat; then clover."

Mr. Stephen G. West, jr., of Troy, Wisconsin, writes: "The season just passed has been an unusually hard one for farming in this country. Winter wheat is generally a good crop; usual product per acre from 25 to 30 bushels on new land, where the yield is much more certain than on land long cropped. Method of putting in a crop on new land is as follows: Break the ground between the first of May and the first of August; harrow once before sowing and twice after. By seeding the first of September, harvest will ensue about the 20th July. After the first crop the yield is generally less, except on clayey land, which yields more the second and third crops than at first. We usually sow spring wheat after winter grain, with good success. The hedge row variety is preferred."

Mr. James D. Bell, of Walden, Caledonia county, Vermont, states that

the eastern range of the Green Mountains passes through that town from southwest to northeast, forming the highlands between the Connecticut and Lamville rivers, being in latitude 44½° north, and having an elevation equal to any in the State. It snows there eight months in a year, and July is the only month exempt from frost. Fair crops of grass and grain are produced; crops come to maturity in about ninety days. Wheat is sown from the first of May to the first of June; harvested from 15th August to middle of September. Average yield twelve bushels per acre. Best remedy for weevils, late seeding. Wheat is worth $1 25 a bushel. Mr. Bell estimates the cost of growing corn at only 20 cents a bushel in that cold, elevated region; yield, 40 bushels per acre. It is manured in the hill with a compost of muck and hog manure. It is worth $1 a bushel.

Mr. Coles Cook, of Addison county, in the same State, writes that but little winter wheat is grown in that county; while spring wheat is raised in considerable quantities. Black Sea is the variety mostly cultivated; average crop about 20 bushels per acre. Time of seeding is the month of May; harvesting, in the month of August. Quantity of wheat sown, 1½ bushel; prepared by soaking 24 hours in strong brine, adding as much recently slaked lime as will cover every kernel. Excellent spring wheat is raised on greensward, either with or without manure. This crop also does well after corn, peas, and potatoes. Some prepare land in the fall for spring wheat, and seed as early as the ground will permit.

Mr. Joseph Parker, of West Rupert, Vermont, says: "This formerly was a great grain-growing country; but owing to several causes the consumption of wheat at present far exceeds the product. Our former method of growing wheat was to summer fallow, and sow, from the 15th to the 20th September, 1¼ bushel per acre; but that practice is now nearly abandoned, save occasionally on a piece of land recently cleared. Black Sea and tea are the kinds of summer wheat mostly grown. The seed is soaked in brine twelve hours and rolled in lime. Crops vary from 15 to 30 bushels per acre.

Mr. M. F. Palmer, of St. Albans, Franklin county, Vermont, writes that "the production of wheat is increasing both in the quantity sown and the yield per acre. Spring wheat of the Black Sea variety is mostly grown. This variety is preferred, especially for late seeding, as it is less liable to rust than other kinds. One bushel and a half is usually sown upon an acre, from the 1st to the 20th of May, mostly after corn or potatoes. I have for eighteen years prepared my seed by washing it in strong brine, and mixing with it fresh slaked lime in sufficient quantity to render it dry enough to sow. From seed thus prepared I have never had wheat to smut in the least; and I regard it as an effectual preventive. The best and only remedy known here for the grain worm—sometimes called weevil—is late seeding. In this climate we sow from 17th to 25th May, and the grain is not in blossom till the season in which the insect deposites its eggs has passed."

Mr. Jacob Shallcross, of Frankford, Pennsylvania, writes that the Mediterranean wheat is preferred in that district, because it is least subject to injury by insects and rust. Farmers there plough but once in preparing ground for seeding, and that but a few inches deep. The annual yield per acre is diminishing. Mr. S. recommends the following system of rotation: First plant corn, and sow clover seed in February, instead of

oats; plough in the clover when fully grown, (not ripe,) instead of manuring for wheat; then plant corn, in place of growing hay, which is the most unprofitable crop a farmer can raise in this part of the country. The average price of wheat in 1850 was $1 15, and the average product per acre twenty-five bushels with good farmers.

Mr. George H. Bucher, of Cumberland county, Pennsylvania, says the soil of that county is exceedingly variable in quality, some parts being strong limestone land, others slate, clay, or sandstone. The yield of wheat per acre differs as much as the fertility of the land and the skill of its cultivators. Mediterranean wheat is preferred, being more hardy, ripening earlier, and is less injured by mildew, freezing and thawing in winter, and insects. Mr. B. highly commends using a drill in seeding, rather than sow broadcast. Seed is placed at a uniform and proper depth when drilled, ripens evenly, is less injured by the heaving of frost, endures the winter better, and yields considerably more grain at harvest.

Mr. Asa Manchester, of Washington county, Pennsylvania, says that wheat ground is ploughed early in spring, so that it will freeze, frost being regarded as the best pulverizer. It is then sown early with oats; which being havested, the stubble is turned in 8 or 10 inches deep, the land further cultivated, and seeded with wheat about the 20th September. Soil, a strong limestone clay. Crops harvested vary from 15 to 40 bushels per acre. He adds: "Immediately after sowing wheat, and harrowing both ways, we sow timothy seed, a bushel and a half to ten acres, for pasture, and bush it in, crossing the harrow marks, which fills them and prevents washing—a matter of some importance in a hilly country, liable to be cut up into unsightly gullies. The bush is made by boring 10 or 12 holes in a beam 7 or 8 feet long, and filling them with brush. We have never missed a crop of timothy put in after this manner. The peculiar advantages are that it pulverizes the ground very fine, and buries the seed at just the right depth, so that it all grows. To keep our land we plough it only once in 8 or 10 years."

[Bushing in grass seed, including clover and flax seed, is a practice universally commended by farmers who have fairly tried it.—Ed.]

Mr. George T. Powell, of Uniontown, Fayette county, Pennsylvania, writes that white wheat is worth from 10 to 12 per cent. more a bushel than Mediterranean and other dark varieties; but the first named is less prolific and more injured by insects, rust, and mildew. The average yield in Fayette county is estimated by Mr. P. and several experienced farmers at 13½ bushels per acre, which is obviously increasing. In seeding they sow 1½ bushel of Mediterranean per acre, and 1¼ of other kinds of wheat; knows of no remedy against Hessian fly, but keeps weevils out of a mow of wheat by sprinkling the grain lightly with salt while mowing it away at harvest. "It is efficacious against weevil; and if it were not so, the salt in the straw would not be lost."

Mr. R. P. Stevens, of Cerestown, McKean county, Pennsylvania, informs us that the soil in that county is not well adapted to the culture of wheat, it being deficient in lime, and formed mostly of decomposed shales and sandy slates, underlying the conglomerate of coal measures. Whatever of lime the soil contains is derived from calcareous rocks at the north of us in the State of New York. "We are, however, improving in the culture of wheat. Varieties grown are white bearded, Michigan flint, and Soules." The average yield is not far from 15 bushels per acre. Land

is ploughed twice from sward, and once when buckwheat is ploughed in; depth of ploughing eight to ten inches. The yield is increasing. System of rotation from grass is wheat, oats or corn, buckwheat, and seed down with timothy or timothy and clover. We are not troubled with either fly or weevil; average price of wheat, $1 50. Wheat is not our principal crop.

Mr. Jeremiah Brown, of Luzerne county, Pennsylvania, writes that old land yields about 10 bushels of wheat per acre, and new twenty, in that county. Sow 1¼ bushel per acre in September, and harvest in July. Price $1 a bushel.

Mr. Benjamin J. Passmore, of East Nottingham, Chester county, Pennsylvania, writes that the Mediterranean wheat yields much the best in that county. At the last harvest other kinds were much injured by rust and mildew, while the first named nearly escaped without damage. Average crop per acre 18 bushels; time of sowing latter end of September; average price $1.

Mr. James A. Such, of New Lebanon, Mercer county, Pennsylvania, says the average yield of wheat in that county is 15 bushels per acre; and in preparing land for this crop they plough twice, seven inches deep. The yield per acre is increasing; price per bushel, 85 cents.

Mr. John Blackfan, of New Hope, Bucks county, Pennsylvania, describes the larvæ of an insect, probably the true wheat fly *(cecidomyia tritici)* developed in the seed of wheat when in the milk and dough state, which is less than a timothy seed. When not preyed upon by insects, wheat turns out 20 and sometimes 30 bushels per acre in that county. Mr. B. is a great friend to frequent change of seed, having found it highly beneficial. In speaking of "plaster as a manure," he says: "Large quantities are yearly sown on grass fields in the spring; about a bushel is mostly sown. It is found by experience that its effects on grass are much increased by adding an occasional dressing of lime; and if applied plentifully a number of years in succession to land without liming, it almost entirely fails to have any effect. Plaster mixed in the proportion of one part to ten of leached ashes, and a small handful dropped at every hill of corn before covering it, has been found by many of our farmers of great benefit."

Mr. John McSparran, of Fairfield, Lancaster county, Pennsylvania, writes that Mediterranean wheat yields 22 bushels per acre; white bluestem 25 bushels, and "mountain" also 25 bushels. Time of seeding from September 1 to October 1, and of harvesting from June 25 to July 15. Plough but once, four or five inches deep, and sow from 1½ to 1¾ bushel if put in with a drill, and from 1½ to 2 bushels when scattered broadcast. Price, 95 cents.

Mr. John G. Landis, of Lancaster county, Pennsylvania, speaks of that county as first in agricultural improvement and mineral resources, particularly iron, in the State. Its iron interest is greatly depressed. Wheat crop is 20 per cent. better than in 1849; his crop averaged in 1850 26¾ bushels per acre, being about the usual harvest this season; yet an acre or so often yields from 30 to 40 bushels. Land is ploughed but once, eight inches deep, early in August; then cultivated with the harrow and cultivator. Time of seeding from the last of August to the middle of October. The kind of wheat most successful and generally cultivated is the Mediterranean. Quantity of seed used from one to two bushels per acre.

Mr. Thomas Stocks, of Oak Hill, near Greensboro', Georgia, writes: "We break up our ground and put about 10 bushels of cotton seed as manure per acre, and sow about a bushel of wheat any time before 10th December. Ground thus prepared will yield from 15 to 25 bushels per acre, according to the quality of the land. The only preventive against the weevil is sunning the wheat before it is stored away in the granary." [Mixing lime with it is said to be a sure remedy.—Ed.] Mr. S. says that the best rotation is for corn always to follow cotton, and wheat corn; and after wheat let the land lie idle a year, then plant cotton again, so making three crops in four years. A plantation well ditched on hill-sides and cultivated as above will never cease to make a remunerating return to the planter, particularly if he puts what manure he can raise on galded spots only.

Mr. Albert Hill, of Le Roy, Genesee county, N. Y., says that the average product of white flint wheat in that county is 27½ bushels per acre. This is a better account of wheat-growing in Genesee than has been given by gentlemen who knew next to nothing of the land and excellent farmers of that region. They sow from 1½ to 2 bushels seed per acre. Earth ploughed 8 inches deep yields better, as tested by experience, than when ploughed 6 inches.

Mr. A. A. Huntingdon, of Columbus, Wisconsin, writes that in that new country one and a half bushels of seed are sown per acre; and that the crop of 1850 was quite poor. Early seeding does the best. Seed is washed and soaked in strong ley to prevent rust.

Mr. Ashbel A. Hosmer, of Riga, Monroe county, New York, a good farmer, sows his wheat without any preparation, except to have it perfectly clean or free from other seeds, at the rate of 1½ bushel per acre. Clover and plaster are mainly relied upon to keep up the fertility of the soil—turning the clover when in blossom.

WHEAT AND OTHER CROPS IN OREGON.

Sir: I have just received one of your circulars, and hasten to give you what information I am possessed of, in compliance with your request.

WHEAT.

We have three varieties in common use: First, what we call the white fall wheat, which is considered the best for market, on account of making the whitest flour; but it is not generally preferred by farmers for bread, as it dries up in one or two days in summer, so that it is hardly eatable. But mixed in about equal parts with the red-bearded or Mediterranean wheat, a better article of bread is formed. White wheat is open and porous; consequently, it gathers moisture in the rainy season in this country, making it difficult to grind. The red bearded or Mediterranean is very hard and flinty, and generally weighs from 3 to 7 pounds per bushel more than the white, which is better to grind in the dry season, and the red in the rainy season. The third kind is a bald red wheat, and there is a bald white spring wheat coming into use. The first-mentioned variety is most common, having the advantage of producing the largest crops, and those most marketable. The time of sowing white

wheat is in September and October; and it may be sown any time during the winter when the ground is in condition, *i. e.*, dry enough for seeding. I sowed the last of February one year, on bottom land, and obtained a larger crop than on upland, sown in autumn, harvesting 38 bushels per acre. One of my neighbors sowed the same variety in May, (from the 8th to the 10th,) and reaped in August about 27 bushels per acre; but it is not safe to seed so late, for it is not properly a spring grain. Our crops of white wheat may be 27 bushels in ordinary seasons; but, taking all the land cultivated in wheat into the account, I do not think that the average exceeds 25 bushels per acre.

One year I sowed about 4 acres with a mixture of white and red bearded, in April, hoping to obtain a crop of hybrid wheat. It all grew apparently well until about a foot high, when the red bearded shot up and headed most beautifully; but the white remained, and spread out over the entire ground in a perfect mat, and did not come to maturity that year. Some of my neighbors have sown the white wheat in August; but it did not come up till the showers of September, when it grew well, and produced a fine crop. The red-bearded has a wider range as to the time of seeding than the white. It may be sown in August, September, and all the months of winter and spring. One of our neighbors sowed it on the 17th June, and gathered the same season about 18 bushels per acre. This, however, is an extreme case. I generally sow this grain about the 20th April—sometimes a little earlier. A good crop may be generally expected if the seed is in the ground by the middle of May. This is naturally a spring wheat, but grows equally well in this climate if sown in autumn, and sometimes yields better. In 1846 I sowed 15 acres in April, and, the season being dry, I got only about 16½ bushels per acre. The crop was uneven in ripening, owing to the drought coming on soon after it was sown. In harvesting it shattered considerably, and the fall rain caused it to germinate and take root; and, without either plough or harrow, it gave a yield of 25 or 26 bushels per acre. This volunteer crop ripened in July, and the straw was from 5 to 5½ feet in length. A neighbor tried the experiment, and obtained 25 bushels per acre. No smut or chess was the result of this self-seeding crop, as we term it; but the ground was found to be more foul with weeds than that which had been cultivated.

Our harvest usually occurs in the latter part of July and fore part of August, although I have seen wheat stand till October before it was ripe enough to cut. We make no preparation of seed more than to have it free from other kinds of grain. The quantity sown per acre varies from 1 to 2 bushels; but most farmers sow from a bushel and a peck to a bushel and a half, according to the kind of wheat and season. The white, having a larger berry than the red, requires more to the acre. I always sow 1¼ of the red, and 1½ of the white.

We seldom plough more than once, sow on the furrow, and then harrow well. We plough from four to seven inches deep, and sometimes nine inches. No particular system is as yet adopted as to depth or time of ploughing, each one satisfying himself; yet those who are particular in preparing their ground, and putting in their grain well, are the most flourishing. No doubt a few agricultural periodicals would benefit Oregon. Where crops are grown in rotation, with wheat, peas are the best. The fact that oats seldom winter kill in this country, renders this crop entirely

unfit to either follow or precede wheat in rotation. The plan now generally pursued, is to let the land remain without any crop one or two years and pasture it, when it is ready for wheat again.

The climate of this country being so cool in summer, makes it a natural wheat-growing region. This alone, no doubt, has a great influence in respect to Hessian flies and weevils. The former I have never known in this country; and the latter I have not heard of but one season, and they were confined to two or three granaries of the Hudson Bay Company. I can give no other than hearsay information concerning the weevils. The general opinion at the time was, that the grain had been thrashed and stored in the granary before it had undergone the sweating process, which always takes place in the mow or chaff subsequent to thrashing. I have never known weevils to get in grain in this country while it remained in the field; and in only one instance anywhere. There have been large quantities of wheat stored in granaries in different parts of Oregon, and particularly at the time those of the Hudson Bay Company were affected. Great fears were entertained by most of those having wheat in storage, while no apprehension was felt by such as had wheat in fields or in the mow. The rust sometimes appears on wheat in Oregon; but I have never seen it injured by this malady. In the summer of 1845, in particular, as I walked through my wheat field, my clothes would become entirely colored with the rust; but during the season I did not find a stem or head injured by it. The cause of the rust was frequent warm rains in June, and a hot sun shining upon the grain immediately after. The average price of wheat at Oregon City (our nearest market) is $1 50 per bushel; the range being from $1 to $2.

CORN.

So little corn is raised in Oregon that I shall say but few words on the subject. The climate is too cool for this crop to do well; and I have not seen a failure of frost in the fore part of May any year since 1839. Frosts are not uncommon in June, such as materially injure corn, but not wheat, rye, nor oats. If wheat happens to be in bloom then, it is seriously injured. One of my neighbors raised 15 to 20 bushels of corn to the acre; but it can never become a staple crop, owing to the climate.

OATS.

This crop is generally good, though not very extensively cultivated; and, therefore, we have a good home market at a better price than wheat. Forty bushels is the average yield per acre. Oats are frequently sown in autumn, at the rate of two bushels per acre; the winter having but little effect on them. They grow self-sown, and are apt to come in wheat if not guarded against. I have grown this grain on the same piece of land five successive years; but the last crop was a poor one, on account of the dry weather, yielding only about 16 bushels per acre. The fourth crop was 65 bushels, the season being very favorable.

Barley, rye, and beans grow very well, but are little cultivated. Peas are cultivated to clear the ground for wheat, and are admirably adapted to that purpose. They yield about 18 bushels to the acre, and leave the soil in a good condition for any crop. The ground appears much reno-

vated by this crop in many cases, and, in truth, I may say in all cases, though more perceptible in some than in others. We find the same soil will always produce a better crop after peas than without them.

CLOVER AND THE GRASSES.

This being a northern latitude, it is probably expected that quantities of hay are made to subsist the herds of cattle and horses found here, but information only is wanted to show that Oregon, at present, needs but little winter food prepared for cattle or horses. In the fall of 1849 I prepared about seventy dozen sheaves of oats to winter thirty head of cattle and six horses, which was sufficient to winter them, and all in good order in the spring. The winter was a hard one for this country. This fall, my oat crop being poor, I have prepared about two-thirds as many for my stock. This leads to another observation which may not be out of place here, viz: that whenever we have a dry season and a light crop, we are sure to have an open winter. On the other hand, a wet season, which produces large crops, is always followed by a comparatively severe winter. But little hay is made in the Territory, in comparison with any of the northern States. Timothy, redtop, and blue-grass all flourish here, and clover in some portions of the country. I have seen timothy, the second year from the seed, grown six feet, bearing a head ten inches in length. The soil is generally of a close, firm texture, and better adapted to herds-grass than clover. I have seen about two tons of timothy hay cut from an acre. Hay is little used, as cattle in hard winters are fed mostly on wheat straw.

NEAT CATTLE.

In this country we usually raise all our calves, and give them a part of the milk until they are six months old, and some have milk until the cows naturally wean them in the fore part of the winter. My usual method is to give the calf from one-fourth to half the milk, according to the quantity which the cow gives and the size of the calf, up to the time it is four months old, and then gradually diminish the ration till it is six or seven months of age, when it is in good condition to stand the winter rains. The amount of food necessary for winter is small, as cattle do not need feeding over three or four weeks, all told, during the winter. I express the opinion, after ten years experience here, that it will cost about as much to winter cattle in this country as the same number of sheep in my native place in New York, i. e., about a ton of hay to ten head, taking open and close winters together. Horses will be in about the same ratio, although many horses and cattle are never fed, particularly the Spanish breed. The actual cost of rearing, until three years old, is mostly while sucking calves; and, as near as I can calculate, the milk and care, before weaning, are equal to $15; to which add the cost of wintering, and a little for salt and attention, and the expense of rearing a three-year old steer is not far from $25. The value at that age is generally from $35 to $40 for steers, and $25 to $35 for heifers. Another consideration places heifers in quite a different light. With few exceptions, they produce calves when two years of age, thus becoming cows with second calves when three years old. Many have their first calves when eighteen months

old; and some even as young as fifteen months. In some cases, instead of becoming a dam at three years of age, they are really *grandams.* There are more that produce calves under two years than there are that go till they are three; but these young cows are not at their best for dairy purposes before they reach four or five years of age, when they are valued at from $50 to $75. Some sell as high as $100. It will be understood that the prices above named are paid for American, not Spanish cattle; the difference between the two being about twenty per cent. minus the Spanish.

I have never known beeves stall-fed in this country, and yet the beef fattened on grass is quite as good for fresh as any stall-fed. For salting and foreign consumption, the difference is sometimes very great; inasmuch as the fat of the animal (the tallow included) is not so hard, and frequently appears quite oily. Trials have been made in salting for foreign markets, when it was found that the beef of American cattle, i. e., stock brought from the Atlantic States, would keep in a sound condition, while that of Spanish cattle would be so injured, after having been packed two or three months, as to be unfit for use. This difference is supposed to arise from the hardness of the former, and the softness of the latter Beef cattle on foot are worth from six to ten cents per pound; butcher's meat from seven to twenty. Steers from three to four years of age usually weigh from 600 to 800 pounds, quarters only.

DAIRY HUSBANDRY.

As before observed, calves are nearly all raised in this country, and the quantity of butter and cheese produced is proportionably less on that account. Taking our dairy cows together, I estimate the average yield per cow at 50 pounds of butter, and a corresponding ratio for cheese when made. Butter has averaged the past year about 50 cents a pound; cheese 40 cents. Labor is so high here that the cost of making these articles is nearly equal to the prices which they bring. It is very difficult to get at these things with any exactness, but I have formed as just an estimate as practicable, under circumstances so fluctuating.

HEMP.

Previous to the discovery of California gold, hemp was experimented upon by my neighbors who were acquainted with its culture in the western States; and they reported the growth to be better and of a firmer texture than any produced where they were acquainted. It has not been cultivated since.

ROOT CROPS AND VINES.

The potato crop has been free from the rot until this season. I discovered that a small piece of potatoes which I had manured in the hill had black specks through them of the appearance of particles of earth, which alarmed me; and on inquiry I found that the crops of my neighbors were similarly affected. I have tried experiments by putting a few alone in the open air, and together in a body, and the tubers remain the same, without being more or less affected. It is worthy of notice that

potatoes immediately adjoining, manured in the new manner, were entirely free from those specks. Onions, parsnips, carrots, beets, turnips, cabbages, tomatoes, &c., all grow most prolific, but are not extensively cultivated. I usually grow a small portion of each for family use only, and I am not prepared to give any useful suggestions in reference to these crops. Squashes, pumpkins, and melons are not sure crops here, owing to the late frosts in the spring, unless covered at nights. When planted as late as the 10th May, in rich ground, they grow finely, and bear well. The best way to prepare ground for culinary vegetables in this country is to make a yard, or fence a plot of ground by itself, and in the summer, when it is dry, say from June until fall, yard cattle on it nights instead of putting them into the barn-yard. This will give the soil a good coat of manure; and as soon as fall rains moisten the ground, plough well about seven inches deep, still letting cattle run upon it so long as it is dry enough not to injure the ground by treading it. This plan of manuring I think very highly of, where it can be done, and is preferable to hauling out stable manure. The earth receives all the urine as well as dung, which is a matter of more importance than many suppose. I have found, instead of injuring cattle to put them in a yard at night, rather than leave them in their pasture, it is an advantage. In the first place they must have time to chew their cuds, which, of course, may be done as well in a yard as elsewhere; secondly, when cattle lie down in the pasture, the places occupied by them have received the peculiar smell or effluvia of their bodies, which, with their excrements, gives them a distaste for that part of the field or pasture. On the other hand, when shut up during the night, and especially where they have fresh yards occasionally, as they should have, everything is fresh for them in the morning as they go forth with good appetites to graze and gather their needful food. This new process of manuring I have never seen in full operation except in this country.* Last year I raised about four large wagon loads of squashes on a piece of land 26 yards long and eight wide; and the largest kidney potatoes that I ever saw, grew when manured in this way.

Yours, truly,

WILLIAM GEIGER, Jr.,
Quality, Washington county, Oregon.

Hon. Thomas Ewbank,
Commissioner of Patents.

CORN.

The crop of corn harvested in 1850 was very unequal in different States. At the south, the yield was unusually small; the injury being done mainly by protracted dry weather in May, June, and July. In the middle and western States the yield was not far from an average crop; some districts producing more and others less than an average. In New England this grain was somewhat injured by dry weather, the depredations of insects, and other casualties to which corn culture is subject.

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*The plan of manuring described by our correspondent is quite common in all the southern States; and it was doubtless introduced into Oregon by emigrants from Missouri. Yards should be oftener ploughed than he suggests, to fix all the volatile matters voided by stock in the soil.—Ed.

Mr. H. H. Watson, of New Haven, Oswego county, New York, writes that the usual crop there is from 40 to 50 bushels. He gives "the preference to manuring in the hill," as a given amount will go further than when applied broadcast to the land. The market price of corn there is generally 50 cents. Mr. G. Bowdish, of Montgomery county, in the same State, says that yellow corn is sweeter than white, and generally preferred, from the popular belief that the meal of the first-named is more nutritious. "Of the various kinds cultivated, perhaps there is none equal to the small eight rowed yellow." It is generally sounder than larger kinds, and often weighs more than 60 pounds per bushel. Average yield per acre 35 bushels. Corn and cob ground together is the favorite way of feeding domestic animals on this grain.

Mr. Asa Carter, of Champion, Jefferson county, New York, says: "After trying all the various kinds I could obtain, a variety known as the 'red Blair' has proved to be the best. The ear is long, the kernel large and well set, the color white, with a red blaze on the tip of the ear, and the average product on my farm for several years has been from forty to fifty bushels." Some of Mr. Carter's crop this year turned out eighty bushels.

Mr. Seth Severence, of Oswego, writes that crops of 135 bushels per acre have been several times grown in that county; and fifty bushels is not far from an average, among good farmers. Poor farmers harvest not more than half that amount. Increased attention is paid to the saving and application of manure, and to tillage. The Dutton corn (a 12 rowed variety) is commended by Mr. S. as valuable, and worthy of more extended cultivation.

Mr. J. Y. Berry, of Stafford Corner, New Hampshire, applied 4,500 bushels of "marl mud" on three acres of land in 1846, and harvested therefrom 100 bushels of corn in 1847. In 1848 the crop measured 140 bushels; and in 1849 the yield was 60 bushels of oats and 25 of barley; and in 1850 the crop was six tons of red clover hay, with nearly the same quantity of after-math, mown in the middle of October. Another piece marled not only produced large crops of corn, but each stalk became more prolific in the number of ears that set and came to maturity.

Dr. William Johnson, of Prospect Hill, Iowa, describes corn-growing in that State as follows:

"Corn is reckoned, and doubtless is, the most certain crop of this region. Some break the land in the fall, but the general practice is to plough early in the spring. The ground is listed with a plough each way, and the seed planted in the intersections, at the rate of from 2 to 4 grains in a hill. The usual method of covering seed is with a hoe, but many cover with a harrow. With but little attention, 25 to 30 bushels are the average yield; and hence this is *par excellence* the lazy man's crop. Where the land is well tilled and kept clean, the average is about 50 bushels; and it is no uncommon thing to gather from 60 to 70. The price the past year has been 35 cents per bushel."

Mr. H. Little, of Stoystown, Ontario county, New York, says that the small yellow corn is the only kind cultivated in that climate, and it yields about 30 bushels per acre.

Mr. Jonathan Talcott, of Rome, Oneida county, New York, informs us that the average yield of corn in that vicinity is 50 bushels, among good farmers—70 being often harvested. Planted in rows of from 3 to 4 feet

each way. Best method of feeding is ground into meal and cooked. Mr. T. advises seeding after corn with grass seed, (herdsgrass,) at the rate of 12 quarts per acre, sown with or after wheat, rye, or oats, adding 8 quarts of clover seed. Previous to seeding, the ground should be manured, ploughed nine inches deep, and, when seeded, thoroughly harrowed.

Mr. Homer H. Winchell, of Shelby county, Missouri, writes that on land well cultivated, the average yield of corn there is 60 bushels per acre. Best system of culture is to plough deep in the fall, harrow the ground well in the spring, and furrow off at the distance of 4½ feet. Plant the first week in April, keep the ground in good order by repeated ploughing until the first of July, and an abundant crop will most generally be harvested. "Cost of production, as nearly as possible, 10 cents." The New England yellow flint corn has been tried, and proved a failure.

Mr. Wm. Zimmerman, of Keokuk county, Iowa, writes that more corn is cultivated there than any other crop. "We raise both the yellow and white. Manure is not used. Plough once, plant, and, if well tended, (ploughed four or five times,) it will produce 60 or 70 bushels per acre. The cost may be estimated as follows:

Rent of land	$1 25
Ploughing half day	1 00
Planting	75
Tending	1 00
Gathering	1 50
Total cost per acre	5 50"

Mr. George Groves, of Knox county, Tennessee, says that the large white corn is most esteemed in that section, and the yield per acre varies from 25 to 50 bushels. Often the extremes in crops are more distant.

Mr. Henry Merrill, of Marion county, western Virginia, writes that "corn was never better than in 1850." Mr. M. describes in glowing terms the energy with which the Baltimore and Ohio railroad is pushed forward to its completion. This great work will be invaluable to the farming interest of that fertile but sequestered region.

Mr. John H. Tarr, of Fayette county, Pennsylvania, informs us that the most esteemed variety of corn in that county is "the large rough gourd-seed, with from 12 to 16 rows. Cob white, seeds long; and the average yield is from 40 to 50 bushels per acre." "We generally plant on a clover ley, with long manure ploughed in; follow corn with oats and manure, and this crop with wheat." Previous to seeding with wheat, lime and coal ashes are freely used as fertilizers. Corn is usually planted on or near the 25th April, in squares 4 feet from centre to centre. After-culture is done with cultivator and double-shovel plough. *Crop is kept free of weeds and grass till harvest.*" [A capital practice, and one too much neglected.—Ed.] "Price of corn in December, 1850, 40 cents. Cost of production, 8 to 10 cents a bushel, exclusive of interest and taxes on land."

Mr. Alonzo Dutton, of Windham county, Vermont, writes that "corn is considered one of the best crops" in that region. Average yield, 45 bushels per acre; cost of production, some 48 cents a bushel. Best sys-

tem of culture is to spread manure broadcast, plough in, plant in rows 3 feet apart; four stalks should stand in a hill, and the ground should be kept free of weeds and light by tillage.

Dr. John H Weir, of Madison county, Illinois, says: "Corn is produced in great abundance on the American Bottom. The yellow, and a mixture of the white flint and gourd-seed, are the best, and most productive. The Bottom averages 50, and the high prairie 40 bushels per acre. The cost of production is from 10 to 12 cents a bushel. Ground should be ploughed 6 inches deep, furrowed both ways 4 feet apart, planted with three grains in a hill, to be covered with fine earth 2 inches in depth, on or near the first of May. Cultivate with a plough, running the bar next to the corn; and so soon as it can bear it, turn mould to it. Corn should be ploughed at least four times, breaking all the ground between the rows each time. It is fed here whole and raw; but whether the gain from grinding and boiling will pay cost in this part of the country, I cannot say. Corn sells in our market at 35 cents a bushel."

Mr. J. H. Harrison, of Sangamon county, Illinois, writes that corn is much more cultivated than wheat, and is of more value to the farmers in that region than all other crops. In preparing the land for a corn crop, the stalks of the previous year are cut up with a sharp hoe, at the rate of five or six acres per day. They are then raked into rows by a rake drawn by two horses, and burnt. A pair of horses will rake 30 acres in a day.

[This is a valuable hint to corn-growers at the south, where hands spend a good deal of time in picking up and carrying dry cornstalks into heaps, with a view to burn them, or let them rot.—Ed.]

Mr. Harrison says "the ground is well ploughed 3 inches deep," which is too shallow by at least 3 or 4 inches. "It is furrowed off 4 feet each way, and four seeds are planted for each hill, and covered from 1½ to 2 inches deep, with dirt from the furrow. When the corn is 3 or 4 inches high, it is ploughed with a small plough, throwing dirt from it. In eight or ten days it is cross-ploughed, with three furrows in a row; and in ten or fifteen days repeat the operation the other way, and so make the crop. The most esteemed varieties are a kind of yellow corn, very near the gourd seed, and a white gourd-seed, which is about fourteen days earlier in maturing than the yellow. Average product per acre from 45 to 60 bushels; better culture easily increases the yield to 80 or 90 bushels. Labor is now so scarce and high that we cannot afford to expend more on a crop till there is some change."

Mr. A. Cleaveland, postmaster at Yankee Hill, in the same State, writes that the cost of growing corn in that region is about 10 cents a bushel, and the crops vary from 40 to 60 bushels per acre.

He recommends in tillage to turn the earth from the corn in the first operation, and to it afterwards. "Corn should be ground before feeding, and soured, for hogs."

Mr. Ralph Ware, of the "Buel Institute," in northern Illinois, writes that the "corn crop is good, if not the best ever raised since the settlement of the country. We place the average at 45 bushels per acre. One field of 10 acres produced 110 bushels per acre; a number of pieces averaged from 70 to 80." Mr. A. Job, of Cass county, Illinois, estimates the cost of growing corn at 7 cents a bushel. He raises both white and yellow—the former for bread and the latter for feeding stock. Feeds raw and unground, and husks the corn on the stalk.

Mr. Amos A. Hilliard, of Macoupin county, Illinois, says: "All that is required to grow 60 bushels of corn on an acre of common prairie land is, to plough deep, pulverize the soil, and keep the weeds down—all done with the plough or cultivator. Here, where mills charge high for grinding, and labor is dear, we do not grind nor cook feed for stock. Our best method is to cut up and shock the crop as soon as the grain is hard, and while both the stalks and leaves are green. In winter the corn is daily hauled into a lot, to be first fed to fatting cattle; which being turned out, stock cattle follow to eat up the fodder, and these by hogs."

Mr. Joseph H. Merrick, of Franklin, Delaware county, New York, says that the Dutton corn is much approved, and that the average crops, with good culture, range from 40 to 60 bushels per acre. Greensward well turned, after it is manured; gives usually the best harvests. Seed is covered with tar, and then rolled in plaster, before planting, to keep off insects, birds, and squirrels. Before feeding, corn is boiled or steamed, so as to render it soft. In this condition both seeds and cobs may easily be crushed and mixed together.

In his report of the products of agriculture for Delaware county, Ohio, in 1850, Mr. Henry Hodgden writes: "The average yield of corn this year is 40 bushels per acre—25 per cent. less in the western part, owing to a severe drought. Our best method of raising is to plough as early as the season will permit, and deep; plant by the 1st of May, and tend thoroughly with the cultivator and shovel-plough. Corn is generally fed to stock, and is worth 25 cents a bushel. Amount probably grown this year, 650,000 bushels. In favorable seasons many portions of our country will average 50 bushels per acre. Defective farming is the main difficulty."

Mr. Elijah B. Stackpole, of Penobscot county, Maine, writes that "corn has been good the present year." The small eight-rowed yellow corn is preferred. Average crop, 40 bushels per acre; time of planting, 20th May; harvesting, 10th October; cost of production, 50 cents a bushel.

Mr. John D. Lang, of the same county, (Penobscot,) informs us that "the yellow eight-rowed corn, with long ears and small cob, called the early Canada, is most esteemed. The seed is occasionally renewed by importing it fresh from Canada. There is another kind called the "brown," having a larger kernel, and ripening about two weeks later. The former averages about sixty, and the latter seventy five bushels per acre; and I raise from six to eight bushels of white beans in addition. The cost of production is not far from sixty cents a bushel. One method of cultivation is to turn in a crop of grass in the seventh month (July) from ten to twelve inches deep, cross plough in the spring, spread twenty five to thirty cart-loads of manure to the acre, plough eight inches deep, and harrow well. Soak the seed in brine, and mix with plaster; plant ten kernels in a hill, which should be three feet apart in the rows, and the latter three and a half to four feet apart: add a spoonful of plaster to each hill. At the second time of hoeing, remove all but four of the healthiest plants; these will spread over the hill. Hoe twice or three times, top the stalks after blossoming, and let the crop ripen in the field."

Mr. W. S. Sparks, of Somerset county, Maine, writes that the crop in that county now averages about forty bushels with good farmers, and the yield might be considerably increased. He gives a decided preference to the yellow eight-rowed corn, and adds: "The drill system, as far as I

have learned, is considered a great improvement in corn culture, although it is not practised here. I have seen the effects of it in other parts of the State, and the results were good. Compost manure is excellent for corn, especially if composted in the hog-yard—perhaps the best that can be applied to corn-ground. Our farmers are much in the habit of manuring in the hill. Long manure is spread sparingly upon the ground, and ploughed in. Some plough first, spread manure, and harrow or cultivate it in, which, in my opinion, is the poorest kind of economy; and crops so raised are apt to run the farmer in debt. Lime, plaster, and ashes are used as a top dressing, and in compost heaps; and they are found to be very beneficial. The method of feeding corn is ground and cooked I should think the gain is at least 10 per cent. In my opinion from fifty to eighty bushels might, with more care and skill in saving manure, and culture, become our average crops, in place of forty."

Mr. Peter S. Reist, of Lancaster county, Pennsylvania, estimates the average yield of corn in that county at fifty bushels. Some crops have been grown that gave eighty and one hundred per acre. The crop of 1850 was injured by dry weather, and sold at fifty cents a bushel. To destroy worms and insects in corn ground, plough in the fall, and let the earth freeze through the winter.

Mr. James Harkness, of Jacksonville, Illinois, says that the large yellow corn is best for horses, mules, and hogs, the small yellow for neat cattle, and the large white for the consumption of man: average product, about thirty bushels per acre; cost of production, from twelve to fourteen cents. Cultivation: "Break up the ground with a two-horse plough as early as it is fit for ploughing in the spring, then harrow, lay off the rows four feet each way, drop from three to five grains at each intersection, being careful to place the seed near the land side of the furrow; then cover with a bull-tongue plough. As soon as the corn is fairly up, harrow it; then use a one-horse plough or cultivator, and go over the field three or four times. In the mean time, it should be weeded and thinned out to three stalks in a hill."

Mr. James Edgerton, of Belmont county, Ohio, says that the range of the yield of corn in that county is exceedingly variable, reaching the extremes of from ten up to one hundred bushels per acre. Mr. E. states that the Agricultural Society in Belmont county awarded a premium for a crop of sweet potatoes which measured eight hundred and forty-two bushels from an acre. The average of this crop is said to be about four hundred bushels per acre. "Sweet potatoes are usually worth seventy five cents a bushel." In climates adapted to it, this esculent tuber is much less cultivated than it deserves. It is one of the best crops grown in the south for feeding milch cows and other stock.

Mr. J. Widney, who dates his letter "Ohio Farm, Illinois," says: "Our corn crop is good and sound, but does not turn out so well to the acre as people generally expected." As we have no means of learning where his "Ohio farm" in Illinois is, (the envelope of his letter not being preserved, which might show the post office at which it was mailed,) Mr. Widney is informed that the "keg of pure China wheat," which he says he forwarded to the Patent Office, was destroyed by weevils.

Mr. W. A. Bacon, of Bourbon county, Kentucky, writes that their average crop of corn is 50 bushels; but the present year it is about 40. For early feeding large kinds are preferred, but they do not keep so well

through wet winters as smaller varieties. A severe drought during the month of June injured the corn crop in that State. Expense of production about 15 cents a bushel. Culture: "Plant four feet apart; plough twice in a row each way; seldom use a hoe; some use a roller after planting, which no doubt is advantageous, if the ground is cloddy. Feed in the ear."

Mr. George W. Harrison, of Salisbury, Sangamon county, Illinois, estimates the cost of growing corn at six cents a bushel, and says that the crop might be made to average 100 bushels per acre.

Mr. Amos Benton, of Ross county, Ohio, says that "considerably more than 100 bushels have been harvested from an acre in large fields which received only ordinary cultivation." The manure made from corn and cornstalks seems to be the best for the growth of corn. Fields in which cattle are fed, although tramped until from appearance they would not produce any sort of crop, yet, when the ground is broken early so as to have it mellow, yield corn in the largest quantity. Manure made by fatting-hogs is the best, perhaps, that can be used, and its beneficial effects may be seen much longer than those of other manures. Mr. Charles Ruggles, of West Vermillion, northern Ohio, writes that corn averages there 60 bushels per acre, and is grown at a cost of 12½ cents a bushel. Mr. Ezekiel Combs, of Monmouth county, New Jersey, writes as follows: "The yellow gourd-seed corn is principally cultivated in this section, yielding from 30 to 35 bushels per acre. Some good farms produce from 60 to 75 bushels. The average cost of production I estimate at 37 cents. A clover ley, with or without manure, according to the strength of the land, deeply ploughed, well harrowed, marked out four feet by four and a half, kept clean and mellow in the first stage of the crop, and tilled with the cultivator in the latter part of the season, is the management most successful. The best method of feeding hogs that I have ever witnessed is to have corn and cob ground together; boil the meal; let it cool and sour before feeding it. By this process I have found not only great economy in the use of food, but also great gain in flesh. It is sweeter, more juicy, and of fine marbling. For cattle it seems almost indispensable that corn be ground, except the offal at husking time; but I have doubts as to the economy of grinding corn for horses, unless their teeth begin to fail."

Mr. Orange Johnson, of Franklin county, Ohio, says corn is grown at the rate of 60 bushels per acre in that county, and at a cost of 12½ cents per bushel. Easiest way of raising is on turf ground ploughed twice. For feeding he uses a mixture of corn and potatoes cooked. Mr. J. G. Tyler, of Hillsdale county, Michigan, prefers the white dent corn to any other for that climate. It yields from 30 to 40 bushels per acre. Cost of production 25 cents a bushel; hoes the crop twice. Mr. Alexander Hamilton, of Penn Yan, New York, says: "The yield of corn is much better than formerly," owing to the use of plaster applied in the hill, better tillage, and improving land with clover.

Mr. A. J. Willmarth, of Athens, Ohio, says that corn is grown there at a cost not exceeding ten cents a bushel. He cultivates in drills, having a plant every ten or twelve inches in the row, and these four or four and a half feet apart.

Remarks similar to the foregoing might be extracted and extended to almost any length from the great number of letters received at this office.

There is not a State in the Union east of the Rocky Mountains in which corn is not an important crop, and it is rare to find a cultivator of the soil who is not familiar with the production of maize. We have elsewhere given all that our correspondents in the cotton-growing States have had to say on the subject. We are happy to know that this grain is produced cheaper per bushel and more per acre now than at any former period in our history by those farmers who keep pace with the increase of agricultural knowledge in the United States. The gradual improvement of all cultivated lands is an object which cannot be too often nor too earnestly pressed upon public attention. On rich soils corn may be grown to an indefinite extent, at a price which will force its consumption by the millions in western Europe. No other crop, not even cotton, has equal commercial importance, provided corn culture be reduced to a perfect system, based on true scientific principles. As an article of every-day consumption by man and beast, the seeds of Indian corn are without a rival. Slowly, but certainly, it must force its way into common use in England, Scotland, and Ireland; and to this end its most economical production in this country is a matter of the highest importance. One might suppose that commercial cities, which draw all their wealth from the soil, would be willing to establish agricultural schools for the purpose of diminishing the cost of producing the breadstuffs, provisions, cotton, tobacco, rice, grass, and lint seeds, which they export to foreign nations. But, somehow, the denizens of cities fail to see that they have a deep pecuniary interest in the productiveness of rural industry. They never consider the important truth that, when the natural fertility of land is impaired, the loss injures commerce, injures manufactures, injures professional occupations, and injures all educational institutions, quite as much as the farmer. It is a sad mistake to suppose that agriculturists are alone concerned in the practical results of tillage and husbandry. They have no more than a common and equal interest in maintaining or increasing the natural fruitfulness of the earth. Hence all classes should unite to increase the professional knowledge of American farmers. All the sciences which illustrate the principles of agriculture should be placed within the reach of every youth who is to direct the cultivation of an acre of ground. Sciences are best taught and easiest learned in schools having all the appliances to develop and explain their elements and combinations. If an increase of knowledge would save only five cents in the cost of growing a bushel of corn on an average throughout the Union, the aggregate annual gain would exceed twenty millions of dollars. We have given the names of intelligent practical farmers who vary in their estimates of the expense of producing this great American staple from six up to sixty cents a bushel. What is most needed, particularly in all the Atlantic States, is those elements of this crop which are least abundant in common soils. The raw material for making corn, and the professional knowledge how to obtain it in the cheapest manner, are the weak points in this branch of agriculture. The manufacture of manure in cities and villages from animal and vegetable substances, and the importation of guano, are remedies for the evil which are beginning to attract considerable attention. Marling, limeing, turning in green crops, and subsoil ploughing, aided by draining and greater care in saving and using manure, are efforts in the right direction, and rarely unsuccessful.

THE STUDY OF SOILS.

BY DANIEL LEE, M. D.

A general view of the subject.

If four-fifths of the persons employed in agriculture in the United States work 250 days in a year, their aggregate labor exceeds one thousand millions of days in twelve months. The compensation realized for this immense amount of industry depends in a large degree on the fruitfulness of the soil under cultivation. Hence the study of the sources of fertility, and of the causes of barrenness in improved land, has a direct bearing on the every day employment of more than two-thirds of the labor and capital of the republic. It is almost impossible to over estimate the importance of understanding all the elements and circumstances which affect the natural productiveness of the earth. To show what American soil and climate have done, and are capable of doing, we give below a statement of the premium crops of corn grown in Kentucky in the year 1850. There were nine competitors, and the surface in cultivation ten acres by each competitor. Their names and the product of each per acre were as follows:

J. Matson, 37 barrels, 4 bushels, and 1 quart;
Peter Pean, 37 barrels and 4 bushels;
S. H. Chew, 27½ barrels;
J. Hutchcraft, 23 barrels;
A. Vanmeter, 21 barrels and 3½ bushels;
H. Hedges, 21 barrels and 2 bushels;
E. W. Hockaday, 20 barrels;
Dr. B. W. Dudley, 20 barrels;
H. Varnon, 19 barrels and 3 bushels.

Mr. James Matson took the first premium; and his crop was certified to by Mr. Peter Pean, who was his close competitor—Mr. P.'s crop being only *one quart less*. The reader not familiar with the barrel measurement of corn, is informed that a "barrel" is five bushels of shelled corn; so that Mr. Matson produced 189 bushels and 1 quart per acre, or 1,890 bushels and 10 quarts on 10 acres.

The ninety acres cultivated for premiums, yielded 10,960 bushels and 10 quarts; being an average of 121 bushels and 24 quarts per acre. Make all reasonable allowance for shrinkage in drying, and throw in something for the natural tendency of man to strain a point in a keen competition, and still the productiveness of the soil is most extraordinary.

CHAPTER I.

ORIGIN OF SOILS.

All *soils* are formed by the intimate mixture of the *debris* of rocks, in the condition of sand, gravel, or clay, with remains of plants and animals in the shape of *mould*. Earth that contains no mould, or combustible

matter, is not a *soil;* nor will vegetable or animal substances *alone* form one. The proportions of sand, clay, and mould in a soil, vary indefinitely. Not only is this true, but the nature, composition, and value of different kinds of sand, clay, and mould, vary in an equal degree. A very slight change in a soil is often adequate to double the reward of every day's labor expended in growing crops thereon. Hence the necessity of studying closely all defects in the surface which a farmer has to operate upon, whether his land be in tillage, pasture, or meadow. As the division of soils into *mould*, *sand*, and *clay*, is the most natural, we will discuss the subject under these three heads.

Vegetable and animal mould.

If the forest-leaves that annually fall to the ground did not rot, and become ultimately dissolved and return to their original elements, they would soon accumulate to the depth of many feet. The progress of decay in all vegetables and animals and their products, is governed by fixed natural laws; and these organized bodies decompose in that way which will best promote the growth of new generations of living beings. *Mould* is the half-way house between the living and the dead in the organic and inorganic worlds. It covers the surface of islands and continents like a carpet, and is a treasure of inestimable value when properly used by the husbandman. The fertilizing power of mould depends partly on its peculiar mechanical and porous structure, and partly on its chemical composition. All porous substances, like charcoal, platinum sponge, and well pulverized clay or loam, have the property of condensing *gases* and retaining *odors*. This is shown in the practice of burying dead animals in mould, charcoal, or earth, to prevent the escape of offensive odors and gases to poison the atmosphere. This property in mould is purely mechanical; but it is none the less useful in the economy of nature on that account. When intimately mingled with compact earths, by the use of the plough, harrow, and cultivator, mould increases their friability, and promotes the chemical action of atmospheric air and the development of all the latent elements of fertility in the soil.

The dark color of mould favors the absorption of solar heat, and thus warms the ground, while it is peculiarly calculated to imbibe dews and a large quantity of rain-water. That both heat and moisture are indispensable to the growth of vegetables, is known to every one; and to secure these, mould plays a conspicuous part. It is, however, as the food of cultivated crops, that the farmer should study the remains of former plants and animals with the greatest care. That the several atoms contained in one corn or wheat plant are well adapted to form another plant of the same kind after the first is decomposed, is a truth too obvious to be seriously questioned. But why is it that the remains of a turnip or potato form mould or manure adapted to the natural wants of all other crops?

This is the reason: all crops, including, of course, turnips and potatoes, consist mainly of three elementary bodies, called *carbon*, *oxygen*, and *hydrogen*. Thus, if we carefully burn, with the air mostly excluded, wood, starch, sugar, oil, gluten, fat or lean meat, *coal* may be produced. The essential element in this coal is *carbon;* and it is the prominent element in all mould. Carbon, whether derived from the decaying carcass of a dead horse, from rotting wood, or a diamond, is ever the same. It

forms not far from half of the dry solids of all plants, and some 40 per cent. of all animal tissues. It is carbon that imparts the dark color to swamp muck, mould, vegetable and animal coal. The supply of carbon in nature is abundant for all useful purposes. In every 100 pounds of lime rock and marble there are about 12 pounds of pure carbon; and, admitting these rocks to exist in the crust of the planet to the extent stated by geologists of high repute, the carbon locked up in the form of carbonate of lime would suffice to cover the whole globe with a stratum of pure coal to the depth of 400 feet. In mineral coal the amount of combustible carbon is large; but the quantity of coal in the earth is altogether unknown. Ten thousand parts of atmospheric air contain four parts of carbonic acid, and over one of pure carbon.

The farmer's stock of available carbon in mould is rapidly consumed by tillage, just as a manure heap becomes smaller by constantly turning it over. When green crops of a luxuriant growth are suffered to rot on the ground, or are ploughed in, his stock of carbon and mould is renewed to a certain extent.

Oxygen is the next most abundant element in mould, forming ordinarily some 40 per cent. of the combustible matter in all soils. In the solid part of all plants and animals, it exists in a little larger proportion. When organic substances decay, they give off the elements of water (oxygen and hydrogen) faster than carbon is converted into carbonic acid gas. Oxygen is so abundant in nature that it forms more than half of the earthy minerals in the crust of the globe; and it constitutes eight parts in nine of all water and vapor, and 21 per cent. of the atmosphere. When wood or coal is burnt, under ordinary circumstances, 16 parts of oxygen in the air combine chemically with 6 of carbon in the fuel, and the two elements form 22 parts of a heavy invisible gas, called *carbonic acid.* From the same elementary bodies the same gas is produced in all fermentation, and during the decay of organic substances and the breathing of all animals. Oxygen is often called vital air, because it supports animal life; and it is equally indispensable to the life of plants. It derives its name from two Greek words, which signify to generate sourness or acidity. Oxygen is truly an "acid generator," but not the only one known.

Next to carbon and oxygen an element called *hydrogen*, or "water generator," is the most abundant ingredient in mould. It is, when pure, the lightest gas known, being sixteen times lighter than oxygen, and about fourteen-times lighter than common air. Under favorable circumstances it unites with oxygen in the proportion of 1 to 8, and forms water. In wood, starch, gum, oil, and sugar, and in the fat of animals, hydrogen exists in the proportion, or nearly so, to form water, i. e., one part by weight of hydrogen to eight of oxygen; and it retains about the same relation in mould, as will be shown by several analyses. Mould contains another element called *nitrogen*, which forms 79 per cent. of the air we breathe. When animals and plants are undergoing decomposition, hydrogen, in what is termed its *nascent* state, combines with nitrogen in the proportion of 3 parts of the former to 14 of the latter, and the two form a pungent alkaline gas called *ammonia.* This substance also exists in mould. In addition to what are denominated "the organic elements" of plants and animals, mould usually contains an appreciable quantity of soluble flint, (silica,) sulphur, phosphoric acid, iron, lime,

potash, soda, magnesia, and chlorine. These minerals will be more appropriately described when treating of sand and clay.

Dr. Anderson, of Edinburgh, chemist to the Highland and Agricultural Society, has recently made several critical analyses of different wheat soils in Scotland, which are published at length in the July number (1850) of the journal of that society. These soils were generally distinguished for their productiveness. The first ten inches from the surface was regarded as "surface soil;" the next ten inches as "subsoil." 100 parts of the surface soil from Midlothian gave 6.789 of combustible dry matter or mould. It had the following composition:

Carbon	4.500
Hydrogen	0.215
Oxygen	1.806
Ammonia	0.268
	6.789

Although two parts of ammonia in a thousand appear very small, yet when we recollect that an acre of soil ten inches deep weighs a thousand tons, it will be seen that there are over two tons of ammonia in the soil of an acre of rich wheat land, as is shown by analysis. A large crop of wheat takes less than 60 pounds of this volatile alkali from the earth in which it grows. Not an element required by nature in forming wheat, both stems and seeds, was lacking in these soils. In the one above alluded to, an acre contained 45 tons of carbon within ten inches of the surface. This fact indicates the vast amount of vegetation that must have decayed to produce so much carbon. Nor should the fact be overlooked that the plants which formed all this organized carbon, were rich in nitrogen. It is doubtless true that a part of the two tons of ammonia was formed by the union of nitrogen in the atmosphere with nascent hydrogen; yet plants rich in organized nitrogen, like cabbages, turnips, clover, and lucerne, yield richer mould than such as are known to contain very little of this element. Thus, 1,000 pounds of wheat will yield 24 of nitrogen; while the same weight of wheat straw yields but 3 pounds. No sensible farmer would prefer the manure or mould formed by 1,000 pounds of straw to that produced by 1,000 pounds of wheat or corn. Mould, like manure, is very unequal in value. Decaying wood, the stems of flax, and buckwheat straw, yield mould poor in nitrogen; clover, peas, and beans form mould rich in this important constituent of animal food. Before a soil can produce good crops of wheat, it must contain, in an available condition, every substance consumed in forming the stems and seeds of this bread-bearing plant. The poorest soil, so far as its organic elements were concerned, analyzed by Dr. Anderson, gave the following results:

Carbon	0.714
Hydrogen	0.033
Oxygen	0.286
Ammonia	0.089
	1.122

Although the organic matter present is small, being a trifle over 1 per cent., yet the ammonia indicates the growth of fertilizing plants, or the

application of good manure, to form the mould that really exists. If the fertility of land depended mainly on the large amount of the remains of vegetation in the soil, then a black mucky earth should be the best for growing wheat, instead of the poorest. Light sandy soils, almost destitute of mould, have produced fine crops of wheat and corn by the aid of a little guano. This fact demonstrates the possibility of drawing largely upon the atmosphere for carbon, oxygen, and hydrogen, if not for ammonia, in feeding cereal plants. When gypsum or wood ashes produce a fair crop of clover on comparatively thin land, it is safe to infer that not only carbon and the elements of water are drawn from the air, but ammonia, or nitrogen in some other form, also. Nothing of a combustible nature is applied to the soil, while it yields several tons of organized matter, including all in the roots, stems, and leaves of the two or three crops which the ashes or gypsum will produce. Calling the aggregate yield five tons, and the nitrogen consumed will be 240 pounds, while not an ounce has been applied in fertilizers. Leguminous plants appear to possess a similar power to extract nitrogen in some way from the atmosphere, as well as carbon and the elements of water. Unless one has a large supply of cheap manure at hand, it is doubtless sound policy to grow green crops, with a view to form a rich mould for the production of grain, cotton, hemp, tobacco, or sugar cane. The farmer should have a full knowledge of the increase or diminution of organic matter in each field every year. If it is cultivated in a hoed crop, and that removed, he may safely assume that the aggregate of mould has been diminished through the agency of tillage. Where a crop of small grain has been grown, and the ground seeded, either by art or nature, to a degree which gives a good return in grass, clover, or weeds, and this vegetation be allowed to rot on the field, the loss of organic matter effected by tillage and cropping may be fully compensated. When forest leaves, weeds, insects, and cultivated plants rot on the ground, or in the soil, it may interest some readers to be told what substances are formed in the operation. To have a clear idea of the products of vegetable and animal decay or putrefaction, one must not forget the fact that all vegetables and all animals are formed of only *four* simple elementary bodies, of which pure water constitutes two, viz: oxygen and hydrogen. It is true that both plants and animals have other ingredients in their tissues and structure, such as sulphur, phosphorus, iron, lime, chlorine, potash, &c., but these are not endowed with the same indefinite and, apparently, infinite powers of combination which characterize carbon, nitrogen, and the elements of water. Had the possible combinations of these constituents of all living things in the vegetable and animal kingdoms been as limited as those witnessed in metals, the present Flora and Fauna of the world never could have existed. There are some 20 ',000 (more or less) different races of insects and larger animals, and nearly 100,000 different plants, formed essentially of water, atmospheric air, and carbon. It is on this account that when one plant or animal dies and rots, its atoms will feed and nourish any growing plant, and that in turn will feed and nourish growing animals. Infinite wisdom is not less displayed in the economy with which matter is repeatedly endowed with life in the systems of plants and animals, than in the infinite variety developed from different combinations of only four elementary bodies. There is probably not an atom on the surface of the planet, which is capable of organization, that has not been many times

endowed with vitality. Every time we breathe, our bodies lose a part of their solids.

Humic substances are divided by Mulder into such as are soluble in alkalies, and may be precipitated by acids, and such as are insoluble in alkaline solutions. The former he divides into three classes, according to their composition: 1st, such as consist of carbon, and the elements of water in the proportion that these elements exist in water. 2d, carbon and the elements of water, in which there is more hydrogen than the oxygen requires to form water. 3d, those in which there is an excess of oxygen. In all these compounds of carbon and the elements of water, the combining number of atoms of carbon is 40. Thus *ulmic acid* (first obtained from elm, *ulmus*) consists of 40 atoms of carbon, 14 of hydrogen, and 12 oxygen. *Ulmin* has the same composition, with 2 atoms more of water. In the above compounds there is an excess of hydrogen, taking water as the standard. *Humic acid* has 40 carbon, 12 hydrogen, and 12 oxygen. This is simply carbon combined chemically with 12 atoms of water. *Humin* differs from humic acid in having 15 atoms of water in place of 12. *Geic acid* has the same composition, with an excess of 2 atoms of oxygen. *Formic acid* (first obtained from ants) differs widely from the above in having 2 atoms of carbon combined with 1 of hydrogen and 2 of oxygen. *Crenic* and *apocrenic acids*, which exist in all good soils, contain nitrogen in addition to carbon and the elements of water. These acids were first found by Berzelius, in spring water, and took their name from *krene*, the Greek for spring. The following is the composition of these acids:

Apocrenic acid - - - -	C. 48	H. 12	O. 24	N. 5
Crenic acid - - - -	C. 24	H. 12	O. 16	N. 4

C. stands for carbon, H. for hydrogen, O. for oxygen, and N. for nitrogen. Chemists disagree as to the atomic composition of these acids. Sir Robert Kane, at page 640, gives the following description of them: "Crenic acid is a pale yellow, gummy mass, of an astringent taste, very soluble in alcohol and water. Its formula is N. C. 14, H. 16, O. 12. By exposure to air it changes into apocrenic acid, which is brown, of an astringent taste, reddens litmus, and is much less soluble in alcohol and water than crenic acid; its formula is N. 6, C. 28, H. 14, O. 6." Mulder seems to regard whatever of nitrogen there is combined with these acids as a base or ammonia.*

The natural process called "nitrification in soils" is more important in a practical point of view than many suppose. In this operation, atmospheric air, which costs nothing, and water, which is equally cheap, play conspicuous parts. The hydrogen in the water and the nitrogen in the air form *ammonia*, an article worth some 10 cents a pound for making wheat. Nitre, or saltpetre, consists of potash and nitric acid. The last named substance is composed of nitrogen and oxygen, united in the proportion of 14 parts of nitrogen with 40 of oxygen. How the alkalies, potash and soda, and alkaline earths, lime and magnesia, promote the formation of nitric acid or nitrification in porous soils, will be explained hereafter. At present we desire to give the agricultural reader a correct impression of the nature and properties of the organic or combustible elements of his

*The substances above briefly described all result from the slow decomposition of plants and animals on the surface of the earth and in the soil.

crops. In his Chemistry of Vegetable and Animal Physiology, at page 170, Mulder remarks:

"It deserves particular notice that hydrogen is *always liberated* whenever those substances which are the most generally diffused in the vegetable kingdom are changed into constituents of the soil—that is, when *cellulose*, starch, gum, sugar, &c., are in a state of decay. First, these substances are converted into ulmic acid, and that again becomes humic acid; from this, geic acid is formed, which again produces apocrenic acid; and from that, finally, crenic acid is derived. This whole series of transformations must be passed through before the organic substance is converted into carbonic acid and water. The whole process consists in an oxidation, (combining with more oxygen,) and so may be called a slow combustion. It is evident, from the composition of the five substances mentioned, that during the formation of humus, a new quantity of oxygen is continually fixed."

The products of this slow combustion are partly soluble, and in a condition to enter the roots of growing plants to nourish them, and partly insoluble. If all mould was soluble in water, it would disappear in a heavy rain as readily as a mass of snow melts in a warm day. On the other hand, if the residuum of vegetables was quite insoluble, it could never enter the minute pores in the roots of plants, and would be worthless as food for all succeeding generations. Providence has made the solubility of the remains of all living beings *just right*.

Change but slightly the general law which governs their dissolution, and the extinction of all plants and animals would soon follow. Increase or diminish in any sensible degree the vital air which surrounds the planet, and all vitality must shortly cease to be. Change the relative proportions of oxygen and hydrogen in water from what they now are, and it would no longer be *water*, and all plants and animals must perish. Improvements in husbandry can only be effected by the more careful and diligent study of the laws of nature, and ever complying with all their requirements. Some plants and forest trees are much better adapted by nature to live on a thin sterile soil than others, and will, in skilful hands, augment the organic matter in the earth where they grow. In forest culture, a barren soil is often planted with small pines, which in the course of time create a covering of black mould. This mould is drawn from the atmosphere by the decomposition of carbonic acid and water. The economical production of a rich mould where little exists, is a point to be investigated with great care. To effect this purpose, one needs to understand the *mineral* or *incombustible* elements of plants, and the various conditions in which they exist in the soil. Although these elements may be found in the residuum of decaying vegetables and animals, yet they most abound in *sand* and *clay*.

CHAPTER II.

SAND IN SOILS.

Any earthy mineral in a granulated form in the soil is called *sand*. Grains of sand can be produced by the breaking up of almost all kinds of rocks, by frost, and other mechanical forces, and grinding and rolling their fragments over one another in moving water. In studying sand and

clay, it is important to bear in mind the fact that all islands and continents have long been the beds of seas or oceans, and subject to the mechanical action of vast bodies of moving water for indefinite geological eras, or ages. The thickness of sedimentary rocks, which contain fossil plants and animals, is between six and seven miles. In Pennsylvania, fossiliferous rocks beneath the highest coal measures are 40,000 feet, or more than seven and a half miles, in thickness. (See Professor Roger's Report on the Geology of Pennsylvania for 1838, page 82.)

In the peninsula of Tauris, Pallas describes a continued series of primary strata inclined 45° over a distance of 86 miles, which would give a perpendicular thickness of more than 68 miles. (Lyell's Principles of Geology, volume 2, page 443.)

In New England, primary rocks have been measured to the depth of 20 miles. (Hichcock's Geology, page 70.)

The same volcanic forces, deep in the bosom of the earth, which now elevate volcanic mountains, have, in the course of time, forced up from the depths of the sea all stratified and primary or igneous rocks. Volcanic heat, and the immense mass of water that surrounds the globe—a quantity sufficient to cover every part of it a mile and a half in depth—have been the prominent physical agents of Providence, acting in unison with other causes, to bring our planet into its present condition. As all sand and gravel are derived from the abrasion of rocks, the readiest way to learn the nature of the sand in one's soil is to trace it back to the parent rocks from which it came, and study their composition. All rocks have been formed either of melted minerals, cooled under greater or less pressure, or of sediment deposited in water. The former are denominated *igneous* rocks, from *ignis*, "fire;" and the latter *sedimentary* rocks. The latter are frequently called *aqueous*, from *aqua*, "water," and *fossiliferous*, or "fossil-bearing," because they contain an incalculable number of fossil animals and plants, and were deposited in water. Dr. Buckland estimates the thickness of fossil-bearing rocks over the continent of Europe at ten miles. (Bridgewater Treatise, volume 1, page 37.)

Nearly all sand in soils is derived from water-formed sandstone, or fire-formed granite and other rocks of an igneous origin. The purest and sharpest sand is called *silica*, from the Latin *silex*, "flint." Silica is a simple mineral, which has acid properties, and is formed by the chemical union of two atoms of oxygen with one of a simple elementary base called *silicon*, or *silicium*.* Silica is often denominated *silicic acid*, because it combines readily with potash, soda, lime, alumina, iron, and magnesia, to form permanent chemical compounds, called *silicates* of potash, soda, &c. In 100 parts of pure flint sand, there are 52 of oxygen and 48 of silicon. As some three-quarters—perhaps 80 per cent.—of all rocks, taken in the aggregate, are silica, the reader will see that the crust of the earth is more than half oxygen, or vital air. This fact will more clearly appear when we come to study the composition of clay. Every farmer knows that pure sand is remarkably insoluble in water; yet about 67 per cent. of the ash of the stems of wheat, rye, oats, barley, maize, and sugar cane is pure flint, or silica. While a little sand is found in soils in the form of pure silica—derived, perhaps, from crystallized quartz or flint—its mass consists of silicates of alumina, lime, iron, potash, soda, magnesia, and

* Fresenius's Quantitive Analysis.

manganese, and usually in a condition to resist the solvent power of strong acids.

A knowledge of the character of the rocks which formed the sand will enable the agriculturist to judge of its probable composition. If the soil has been washed down from highlands, either mountains or hills, by a river or smaller streams, it is called *alluvium*, or *alluvion;* and the owner must study the nature of the rocks upon which the rains and snows fell that washed the sediment down to his farm. If his soil can be traced to no such source, and lies on an elevated plain, a hill, or mountain, it is probably *diluvion* in its origin, and must be traced either to the action of glaciers, as maintained by Professor Agassiz; to ancient tidal currents and icebergs, as contended for by Sir Charles Lyell; or to the upheaval of the earth at some point far north of the United States, which caused a sudden rush of waters southward, bearing with it granite boulders and a vast mass of loose earth, as is believed by Professor Emmons. It is foreign to our purpose to discuss, in this connexion, the various theories advanced by geologists of the highest distinction to account for what is known as the "*drift formation.*" That the loose earthy matter, which in many places has a thickness of several hundred feet, came from the north, both on this continent and that of Europe, is conceded by all. Thus the deep basin of Lake Ontario is mostly scooped out of a soft sand rock called Medina sandstone. Boulders of this rock, which is peculiar and well known, are found ten, twenty, and even thirty miles south of its bed, scattered over the earth in great profusion, and upon lime and slate rocks hundreds of feet in thickness. So much of the Medina sandstone, ground into fine sand, is spread over large areas of lime rock from one to ten feet deep, that the soil is as destitute of lime as it would be if the lime rock were fifty miles distant. There is, however, a marked difference in the sandy soils north and west of the Alleghany mountains and those lying on the Atlantic slope from Maine to Alabama. The sand of the latter is derived mostly from rocks of an igneous origin, the former from rocks of an aqueous origin. The poorest sands can be found in the Atlantic States, where granite abounds; the richest in western New York and Pennsylvania, and in the western States, where the rocks are all fossiliferous, or abound in the remains of plants and animals. The extent or quantity of these remains in solid rocks and drift deposites, from which the surface of the earth is mainly formed, often imparts to it high and enduring fertility. There are districts in the southern Atlantic and Gulf States where this fact is strikingly exemplified. When the earthy elements of crops happen to abound in a dry sandy soil, it is remarkable for productiveness; but the misfortune is, that such soils are usually too porous, open, and inclined to leach and part with their elements of fertility. Hence the importance of *clay* and *lime* to mix with sand in forming an arable soil. Vegetable mould alone will not answer a good purpose.

All sandstone rocks were once in the condition of fine loose sand. This was consolidated, partly by the pressure of a mountain weight to which beds or strata of sand are subjected in the depths of the ocean, and partly by the infiltration of soluble minerals, as iron, lime, or manganese, which are precipitated or crystallized among its particles. All sedimentary rocks were derived from those of an igneous origin, which atmospheric air, frost, electricity, water, solar light, and vegetation have disintegrated and converted into sand, or clay, or dissolved minerals. When we consider

the fact that portions of the earth's crust subside as far below the common level of its surface as any part is elevated above in mountains, the opinion expressed by Lyell, that fossiliferous strata often sink deep enough to be melted and finally crystallized into granite again, seems not improbable. If this view be correct, then we may say that granite and all plutonic and volcanic rocks are formed by the subsidence, melting, and cooling of sedimentary strata. There are now some 300 volcanoes on the globe which are known; and so numerous are extinct ones, or their effects, that geologists find no reason to believe that the planet has ever been exempt from their powerful action. For the crust of the earth to be always rising up, and nowhere subsiding, must obviously create immense vacancies below its surface. No such spaces are believed to exist; and the evidence of the sinking of the surface, over extensive districts, below the level of the sea, is abundant and conclusive. (See Lyell's Elements of Geology, volume 1, page 430, and before.)

Rocks, the elements of which were melted by internal heat, are divided by this author into three classes, viz: *plutonic*, of which granite and sienite are types; *metamorphic*, of which marble and some slates and sandstones are representatives; and *volcanic*, which are subdivided into *ancient* and *modern*, and appear in a variety of forms. *Basalt* and *trap* belong to the ancient family; while the recent or modern volcanic rocks are found in the vicinity of all active volcanoes. When decomposed, all rocks yield either sand, clay, or both, besides other minerals. Plutonic rocks are *unstratified*, and often denominated "primary," because they were once thought to be in all cases older than sedimentary and stratified rocks. More careful and extended researches have shown that granite has been forced up, and, as it were, injected into masses of fossiliferous strata, in a way to prove that the latter are the older of the two. Indeed, metamorphic rocks are nothing but stratified, aqueous deposites, *metamorphosed*, (changed by heat,) from the action of plutonic or melted matter into a crystalline form. Thus common lime-rock, it is believed, may be transformed into marble, if it be placed in contact with a mass of intensely-heated granite, and both cooled under great pressure. In this operation all traces of the remains of shell-fish and other animals in the limestone will be effaced. Few studies are so interesting as the phenomena exhibited by different rocks, whether we trace their origin and present condition to the action of fire, or water, or to the joint agency of both. The elevation of granite and other mountains is as slow an operation as their wearing down through the corroding influence of oxygen, carbonic acid, the growth of mosses, the expansion of freezing water, and the washings of rain and melted snow. In large districts of Auvergne, in France, the decay of granite is so rapid that Dolomieu called it the "*la maladie du granite.*" The disintegration is produced by the escape of carbonic acid gas from numerous fissures in the rocks, which attacks the silicates of potash, soda, lime, and magnesia in granite and sienite, and liberates the silica or silicic acid. In this operation the silicate of alumina is not decomposed, but remains as pure pipe or porcelain clay, called *kaolin*. All organic substances which yield carbonic acid promote the elimination of potash and soda from their before insoluble combinations with silica; but the time comes when all the alkalies that can be separated by decaying vegetation or manure are consumed in the growth of cultivated plants, or washed out of the soil by tillage. The first decompounding of granite is

to separate it into three minerals, called *feldspar*, *mica*, and *silica*. Sienite differs from granite in having the mineral called *hornblende*, in place of mica, in its composition. The three minerals—feldspar, mica, and hornblende—are very complex substances, which yield not only alumina, (the base of all clays,) but iron, manganese, lime, potash, soda, magnesia, phosphorus, sulphur, chlorine, and fluoric acid, and doubtless other elementary bodies like copper, gold, and other metals. The elementary substances found in plutonic rocks are very variable. Their analyses ought to be repeated by some skilful chemist with all the improved processes for detecting minute quantities of chlorides, sulphates, phosphates, and other salts, which in the old way were not noticed, or vaguely estimated. Mineralogists describe two kinds of feldspar: 1st, *potash feldspar;* 2d, *soda feldspar*, which is also called *albite*, from its whiteness.

	Potash feldspar.	Albite.
Silica	65.21	69.09
Alumina	18.13	19.22
Potash	16.66	
Soda	—	11.69
	100.00	100.00

Feldspar and albite are readily distinguished from quartz by the circumstance that they do not scratch glass, and generally may be marked by the point of a knife. In sienite, feldspar is the predominating mineral. *Porphyry* is a hard rock having numerous crystals of feldspar, which give it a beautiful appearance when worked. Feldspar being an abundant mineral, and the source of much of the clay in soils, we give the formula of several varieties, as calculated by Berzelius:

Feldspar - - K O $Si.O^3$ + $Al.^2$ O^3.3 ($Si.O^3$).
Albite - - Na. O $Si.O^3$ + $Al.^2$ O^3.3 ($Si.O^3$).
Porcelain spar - Na. O $Si.O^3$ + $Al.^2$ O^3 $Si.O^3$ + 3 Ca. O 2 ($Si.O^3$).
+ 2 ($Al.^2$ O^3 Si. O^3).

K O stand for potash; the words mean that the substance referred to consists of an atom of potassium *(kalium)* chemically combined with one of oxygen. Hence, the letters *k o* mean simple potash. Si. O^3 mean silicic acid, or a substance formed by the chemical union of an atom of silicium or silicon with three atoms of oxygen. Fresenius makes silicic acid to consist of silicon and 2 of oxygen, instead of 3. $Al.^2$ O^3 stand for *alumina*, and mean that two atoms of *aluminum* unite with three of oxygen to form that substance. Na. O stand for soda, and mean that an atom of pure soda is a compound of sodium *(natrium)* and oxygen. Ca. O stand for lime, and indicate the fact that an atom of lime is formed by the union of one of calcium (its metallic base) with an atom of oyxgen. Divested of technicalities, potash feldspar is simply a silicate of alumina and potash, just as *alum* is a sulphate of the same bases. Soda feldspar *(albite)* is a silicate of alumina and soda; and porcelain-spar is the same mineral united with lime and two additional atoms of silicate of alumina.

Mica is often called "isinglass," and is distinguished by its bright,

shining appearance, and the ease with which it may be split into exceedingly thin scales. It is found of different colors, from coal-black to perfect whiteness. Mineralogists divide it into potash-mica, magnesia-mica, and lithia-mica. Rose has analyzed the first, Klaproth the second, and Gmelin the third, with the following results:

	Potash M.	Magnesia M.	Lithia M.
Silica	47.50	42.50	49.060
Alumina	37.20	11.50	33.611
Oxide of iron	3.20	22.00	
Oxide of manganese	0.90	2.00	1.420
Potash	9.60	10.00	4.186
Magnesia	—	9.00	0.408
Oxide of lithium	—	—	3.594
Hydrofluoric acid	0.56	—	3.445
Water	2.63	1.00	4.184

The chemical composition of mica in any of its forms is not uniform. The above will give a fair idea of the general constitution of this mineral. It contains more alumina than feldspar, and forms very tenacious clay soils. Mica, however, is less abundant in granite than feldspar, and yields magnesia, which feldspar does not.

Hornblende is a dark-colored, weighty mineral, which is tough and not easily wrought under the chisel. It is sometimes found in regular crystals of various colors, and may be distinguished from mica by refusing to split when heated in the blaze of a candle, and from quartz and feldspar by its darker color. It abounds both in *basalt* and *sienite*. The following are the results of two analyses:

	Basaltic hornblende.	Sienitic hornblende.
Silica	42.24	45.69
Alumina	13 92	12.18
Lime	12.24	13.83
Magnesia	13.74	18.79
Protoxide of iron	14.59	7.32
Oxide of manganese	0.33	0.22
Fluoric acid	—	1.50
	97.06	99.53

We have only to assume the decomposition of a large amount of hornblende to account for the existence of the vast quantities of *lime*, *iron*, and *magnesia* known to all who have paid any attention to the minerals in the earth's crust. Before we proceed to study these and the other earthy elements of cultivated plants, it is proper to consider some of the peculiarities of *clay*.

CHAPTER III.

CLAY IN SOILS.

It has already been stated that the simple mineral called *alumina* is the base of all clay. In 100 parts of alumina there are 53.3 *aluminum*, (a simple metal,) chemically combined with 46.7 oxygen. Alumina con-

tains, according to Sir Robert Kane, 5.3 per cent. less oxygen than silica The effect of this seems to be that, while silica has *acid* properties, alumina has an *alkaline* reaction. Hence these two most abundant minerals in nature have an affinity for each other, and, when united, form the purest porcelain clay, known in chemical language by the name of *silicate of alumina*. Pure clay (kaolin) is composed exclusively of silica and alumina, and usually in the following proportions:

	(1.)	(2.)	(3.)
Silica	54.5	57.4	53.4
Alumina	45.5	42.6	46.6
	110.0	100.0	100.0

Clay usually contains from 13 to 20 per cent. of water. The above figures indicate the composition of three samples of pure clay after all the water was expelled. Ordinary clay in soils contains far more silica and less alumina. It is rare in the clay soils of this country that one finds so much as 10 per cent. of alumina. This mineral is easily obtained from alum and from aluminous earths. It is as white as lime or white earthenware, and has a remarkable affinity for water and organic substances. It combines readily with phosphoric, sulphuric, and other acids, and retains all alkaline minerals in solution with extreme tenacity. Not only all soils, but all sedimentary and igneous rocks, yield alumina on analysis. Even crystals of flint have been found to contain alumina, lime, iron, and potash, by Berzelius. *Greenstone*, a rock of ancient volcanic origin, has the following composition, according to Bendant:

Silica	63.3
Alumina	14.2
Oxide of iron	5.8

It is rare, if ever, that one meets with either sand or lime rock which yields no alumina on analysis, while all slates and shales abound in this mineral. Few rocks form so productive a soil as *basalt*, which is of volcanic origin, and has the following composition, (by Gmelin:)

	Part soluble in acids.	Part insoluble in acids.
Silica	35.741	48.500
Alumina	11.121	6.792
Oxide of manganese	1.487	
Oxide of iron	——	9.383
Protoxide of iron	16.015	
Strontian	0.112	
Lime	11.914	17.395
Magnesia	10.434	13.131
Soda	3.264	
Potash	1.204	
Water	6.530	

The above figures show the interesting fact that basalt contains a large amount of silica, alumina, iron, lime, and magnesia, in a condition insoluble in acids. Not only these minerals, but potash and soda, exist in soils in a similar condition, as will be shown when we come to study the latent resources of poor soils. It is generally known that alluvial clay

lands are both durable and productive. *Why* they are so is a matter not so well understood. It arises from the fact that they possess all the elements of crops in an available condition, and so intimately blended with clay (which is not the food of plants) as to endure without exhaustion for an indefinite number of years. These elements are silica, lime, potash, soda, magnesia, chlorine, sulphur, phosphorus, iron, carbon, oxygen, hydrogen, and nitrogen. Other minerals are occasionally found in cultivated plants; but they are not regarded as indispensable constituents in their composition. It is known that neither of the four organic elements called carbon, oxygen, hydrogen, and nitrogen, can be dispensed with in the growth of any plant; nor can any of the others, except, perhaps, soda, in a few vegetables grown on the farm. Mulder gives very minute analyses of three specimens of clay taken from the Zuyder Zee, which were performed by E. H. Von Baumhauer, with the following results:

	First.	Second.	Third.
Insoluble sand, with alumina	57.646	51.706	55.372
Soluble silica	2.340	2.496	2.286
Alumina (soluble)	1.830	2.900	2.888
Peroxide of iron	9.039	10.305	11 864
Protoxide of iron	0.350	0.563	0.200
Lime	4.092	5.096	2.480
Magnesia	0.130	0.140	0.128
Potash	1.026	1.430	1.521
Soda	1.972	2.069	1.937
Ammonia	0.060	0.078	0.075
Phosphoric acid	0.466	0.324	0.478
Sulphuric acid	0.896	1.104	0.576
Carbonic acid	6.085	6.940	4.775
Chlorine	1.240	1.302	1.418
Humic acid	2.798	3.991	3.428
Crenic acid	0.771	0.731	0.037
Apocrenic acid	0.107	0.160	0.152
Humin, vegetable remains, and water chemically combined	8.324	7.700	9.348
Wax and resin	trace.	trace.	trace.
Loss	0.542	0.611	0.753
	100.000	100.000	100.000

Few river flats, or alluvial bottoms, show soils so rich in the raw material for making bread and meat as the above. It is unusual to find arable soils in which 45 per cent. are soluble in boiling acids, including the organic matter and water of absorption. It would have been instructive to be informed what elements, and how much of each, were soluble in rain-water, or in distilled water; but no information of this kind is given. The quantity of soluble alumina is small. The first specimen gives less than 2 per cent., and the second and third less than 3 per cent. It is generally characteristic of strong fertile soils to abound in the peroxide or red rust of iron. The river bottoms of the Zuyder Zee, so famous for their durability and fruitfulness, contain an average of more than 10 per cent. of this mineral. Of lime the per-centage is unusually large. An acre of com-

mon earth an inch in depth weighs about 100 tons; so that, estimating a soil to the depth of only 10 inches, we have 1,000 tons of earthy matter to operate upon in tillage and husbandry. The average of lime in the samples given is near 4 per cent. At this rate a ton of soil will contain 80 pounds, and, of course, 1,000 tons 80,000 pounds, or 40 tons. Allow 200 pounds of this mineral to be washed out of an acre in a year by leaching rains, and removed in crops, and the quantity above named would last 400 years. A soil, however, will cease to produce grain long before the last particle of lime is taken out of it. The supply of magnesia, though much less abundant, is sufficient for all useful purposes Most crops consume more magnesia than lime, as will be hereafter demonstrated by trustworthy analyses.

The soils under consideration are remarkably rich both in potash an soda, and it is doubtless owing to this circumstance that so large an amount of silica is set down as "soluble." Estimating the potash at one per cent. only, and there are 10 tons of this alkali within 10 inches of the surface on an acre. By examining the figures, it will be seen that the supply of soda is nearly twice as large as that of potash. Consumed at the rate of 100 pounds each per annum, the soda would last four centuries, and the potash two. But before the alkalies in the soil were exhausted, sub-soiling would be practised to render those 20 inches below the surface entirely available to needy crops. Particular attention is invited to the ammonia found in these soils.

The amount is not peculiarly large, but it is an element of fertility too often overlooked in studying the sources of productiveness in cultivated lands. Probably the earths analyzed by Von Baumhauer have been cropped some two thousand years. One hundred thousand parts of these soils contain respectively sixty, seventy-eight, and seventy-five parts of ammonia. This gives 1,200 pounds to the acre, estimating the weight of available soil at 1,000 tons in the earth that contains the least of this volatile alkali. Doubtless the principle source of ammonia is the decay of organic substances in the soil, such as manure, plants, and insects; some is also derived from the atmosphere through the fall of rain and snow. There is another source which is worthy of consideration. Critical readers will see that both the protoxide and peroxide of iron figure in the composition of these fertile lands. The protoxide is literally the first oxide, and consists simply of an atom of oxygen chemically combined with one of iron. The scales that fly off from a heated bar when hammered on an anvil by a blacksmith, are the first oxide or protoxide of iron. The peroxide is the red rust of this metal, and consists of two atoms of iron chemically united to three of oxygen. Now, in converting the protoxide of iron into a peroxide in a moist soil, (a result greatly promoted by tillage,) water is decomposed. Its oxygen unites with the iron to form rust (peroxide) and its hydrogen combines at once with nitrogen in the atmosphere, and is always present in soils, to form ammonia. Most farmers have observed that soils often change their color within a few years after they are first broken up, assuming a darker hue, and sometimes a deeper red. Such soils contain a good deal of iron, and if lime is not wanting, they grow more productive by tillage. In the virgin earth, more or less of this iron is united with sulphur, forming a mineral of a bright yellow color called iron *pyrites*, or sulphuret of iron. Tillage decomposes this compound. Oxygen combines with the sulphur and

forms oil of vitriol, called sulphuric acid. Oxygen also unites with the iron and converts it into the first oxide, when the oil of vitriol and oxide of iron combine and form a very soluble salt called copperas, or sulphate of iron. If the soil contains a sufficient quantity of lime, or the farmer applies it when needed, this mineral takes the sulphuric acid away from the iron by a stronger affinity, and forms gypsum, or sulphate of lime. The protoxide of iron thus deprived of its oil of vitriol by lime, is soon changed into a peroxide, in which condition it is not only harmless to all crops, but a valuable condenser of fertilizing gases by reason of its porous nature.

In well-drained and long-cultivated soils, sulphuric acid is never abundant, because all its salts, except gypsum, are exceedingly soluble, and readily washed away in all water that passes over or through the soil into springs or creeks. When the oil of vitriol unites with soda it forms glauber salts, which, as every farmer knows, are very soluble. With magnesia, this acid forms epsom salts, which are equally liable to be washed out of tilled earth. Alum, or the sulphate of alumina and potash, is subject to the same operation. It takes nearly 500 parts of water to dissolve one of the sulphate of lime, or gypsum. Hence this is the best compound of sulphur for all agricultural purposes.

Phosphoric acid is an element of fertility of great importance, and one which is never wholly absent from any soil that yields either food or clothing for man. Baumhauer found from a third to a little less than half per cent. of this acid in the Zuider Zee clay lands. In ordinary soils most of this acid (which is formed by the union of an atom of phosphorus with five of oxygen) is combined with iron and alumina. The salts are called phosphate of iron and phosphate of alumina. In this form, the acid is sparingly, if at all, available as the food of plants. It is the phosphate of lime, not alumina nor iron, that forms the *bones* of all animals; and it is the phosphate of lime that they require in their vegetable nourishment. Of course, no crop can extract *bone earth* from a soil in which no bone-earth exists. But, fortunately for the farmer, bone-earth can be formed by simply applying lime to a soil that contains phosphoric acid in combination with iron or alumina; for the more alkaline mineral, lime, will take the acid from iron and alumina, and thus produce the phosphate of lime, or bone earth. Let us suppose that all the phosphoric acid had been consumed by previous crops, and by the long-continued washing and leaching of an arated soil; would the application of simple lime, or gypsum, create an atom of phosphoric acid where none existed? Certainly not. Hence the necessity of applying *bones*, or phosphates in some other fertilizer, when this acid is lacking. The *carbonic acid* found in the soils under consideration was doubtless mostly combined with the alkalies, potash and soda, and the alkaline earths, lime and magnesia, forming carbonates of those minerals. A part, however, must have been diffused through the porous mass in an uncombined state. When vegetables and animals complete their decay in the soil, carbonic acid, water, and ammonia are the ultimate products, not to name the incombustible minerals which exist in organized beings.

Chlorine, which abounds in the soils under consideration to an unusual degree, is a heavy gas, of a deep sea-green color, very pungent and irrespirable. It forms not far from 60 per cent. of pure, dry (anhydrous) common salt, which is a compound of chlorine with the metallic base of

soda, called *sodium*. Hence the chemical name of salt is *chloride of sodium*. Chlorine is an important element in the vegetable and animal kingdoms; and salt has been used as a fertilizer since before the time of Moses, and also with human food. We read of salt not fit for the dung-heap, in the Bible, indicating one use to which it was applied. "Ye are the *salt of the earth*," expresses a high popular appreciation of this compound of chlorine, many centuries before the chemical nature of salt was known. Chlorine combines readily with hydrogen, and forms a strong acid called *hydrochloric*, formerly muriatic acid.

All the salts formed by this acid or chlorine in the soil are quite soluble like common salt, chloride of lime, magnesia, and potash, and therefore we seldom meet with so much as 1 per cent. of this element in any tilled land. One-tenth of 1 per cent., or 1 in 1000, is nearer the average in ordinary soils of a fair quality. *Humin, humic acid, crenic* and *apocrenic acids*, and *vegetable remains*, have already been described.

Several thousand specimens of soil have been analyzed by reputable chemists in Europe, the United States, and in Canada; and from the facts thus elicited, the following deductions may be fairly drawn:

1. All the elements of vegetables, whether in the atmosphere, in water, or in solid minerals, are the same in all countries.

2. The elements of all matter endowed with vitality, and performing varied functions in an organized condition, must continue forever the same without change, so long as the existing physical laws govern the mineral, vegetable, and animal kingdoms.

3. The *raw material* for making all crops being known, the accumulation of such raw material is as simple as to make brick, and lay them up into the walls of a house.

4. All the elements of human food and raiment must be well understood by the consumers thereof before these elements can be husbanded with reasonable economy.

5. It is unreasonable to expect that people will preserve from loss and waste any things, no matter how valuable in themselves, so long as they remain in profound ignorance of such value.

6. The least abundant and most precious elements of crops annually thrown away through sheer ignorance of their value involves a needless loss to this country equal to two or three hundred million days' labor by the cultivators of the soil. When a farmer gives as much work for 50 bushels of corn raised on poor land as 100 would cost if grown on rich land, it is plain that he and the public lose half his labor if he needlessly impoverishes his soil, or neglects to improve it when or where he can.

7. Until he knows what are the things in the surface of the earth which render it, when present, exceedingly fertile, and, when absent, perfectly sterile, the husbandman can hardly *begin in the right way* to save and accumulate these elements of fertility.

8. There is reason to believe that good Peruvian guano (the dung of sea-birds) is the best known expression of the most valuable elements of crops, from the fact that practical farmers are able and willing to pay from $40 to $50 a ton for this manure to produce breadstuffs and provisions in this republic, where virgin soils may be cultivated to any extent, without buying the land, or paying taxes, or rent of any kind.

CHAPTER IV.

THE CRITICAL STUDY OF THE ELEMENTS OF FERTILITY IN SOILS.

Having taken a general view of mould, sand, and clay, and incidentally explained the origin and chemical composition of soils, we propose in this chapter to investigate the science of fertility, in order to discover what portion of the constituents of plants the farmer should husband with the greatest care, and what part nature will supply in water and air to his needy crops. To be a skilful husbandman, one should know *what* to husband, and *why* he husbands it. The true principles of agriculture are found to be simple, like all the operations of nature, when fully comprehended. In forming a new plant or animal, no one has reason to suppose that a particle of new matter is created for the purpose. Whatever may be its weight, or form, or substance, every atom in its system existed before the life in the seed of the plant, or in the egg or young of the animal, had a being; and when its life ceases, and its body is dissolved into its original elements, not an atom will be annihilated. Having satisfied ourselves that in the growth of plants and animals nothing really new is created, we may reasonably assume that nature always consumes the same kind of elementary bodies to form the flesh and blood, bones, nerves, fat, and cellular tissues of animals; and hence that their food should always contain substantially the same elements of nutrition.

If we examine the skeletons of the human family as preserved in mummies for thousands of years, and the fossil bones and shells of inferior animals met with in rocks which appear to have been thirty or forty thousand feet in thickness, there is abundant evidence that the minerals used for making shells and bones are the same now that they were in the beginning; nor does it require any elaborate research to satisfy one that all the so-called organic substances in plants and animals, such as starch, sugar, gum, gluten, albumen, oil, fat, muscular and nervous tissues, have ever had the same chemical combinations which exist at this day. It is inconceivable how plants and animals can be organized and live, if formed of other elements than carbon, oxygen, hydrogen, and nitrogen, which alone the Creator has fitted to display all the complex and wonderful phenomena of vegetable and animal life. The things that feed and nourish plants and animals, that constitute their whole weight and substance, are substantial and ponderable matter. If these things were equally abundant in all soils, and equally consumed in forming all crops, then all land in the same climate would be equally fertile. But soils are not of equal fertility, nor are the elements of plants consumed in equal quantities, or supplied in equal parts.

Hence the study of soils in their connexion with cultivated plants and domestic animals presents a wide field for experiment and critical research. The six most valuable elements of all crops, and valuable only so far as they chance to be deficient in any soil, are *ammonia*, *phosphorus*, *sulphur*, *potash*, *chlorine*, and *lime*. It may happen that lime is abundant, and magnesia is lacking, or that potash is more abundant than soda, and sulphur may be less lacking than soluble silica. When the facts are fairly considered that a soil only five inches deep contains some 500 tons

of earthy matter to the acre, and that 200 pounds of guano will often add two tons to the weight of dry matter in a crop of corn, and nearly as much in several other crops, it seems but reasonable to conclude that the 500 tons of earth lack some elements which corn plants greatly need, and that guano supplies the lacking ingredients. The analyses of the fertilizer, of corn, and of soils, lead to this conclusion. If this reasoning be sound, then it is the guano in soils and in crops that the farmer ought to husband with the greatest care; for guano sells in market at $5 for 200 lbs., or at the price of good flour, and is brought by the cargo 10,000 miles for no other purpose than to feed hungry plants now starving in the soils of the United States. Phosphoric acid, ammonia, and potash are doubtless the most important elements in guano, and these substances are least abundant in nearly all cultivated lands.* If we study the natural products of the earth in connexion with the elements of fertility, we shall find that large, long-lived, and thrifty forest trees grow only in soils which are rich in potash. When the farmer has occasion to burn maple, elm, oak, walnut, hickory, beech, and other hard-wood forest trees, he finds them rich in this alkali; and he also finds that soils which produce this kind of timber are always good for agricultural purposes. Their productiveness is not to be ascribed to potash alone, for all the other elements of crops are equally present in an available form; but the existence of an abundance of magnificent potash-yielding forest trees, will never deceive the farmer as to the natural capabilities of the soil. Hence, when a farmer can learn what amount of potash 100 pounds of his soil or subsoil contains in an available condition, (for this alkali exists in combination with flint or silicic acid in an insoluble form,) he may judge with considerable safety of the natural resources of his land. This alkali exists in some soils in a proportion as high as two per cent.—a quantity, however, rarely found—and in others, ten thousand parts of earth yield not one of potash. Such soils are always nearly barren. How far soda can perform the functions of potash in the growth of cultivated plants, there are no data in the practice of agriculture sufficient to settle the question. There is reason to believe, from a few experiments, that it may serve as a substitute in many cases; but to what extent, and in the organization of what crops, future experiments must decide.

To obtain a clearer idea of the importance of this element in farm economy, let us briefly examine the amount of it in good soils, and the quantity taken therefrom in ordinary crops. The report of the Geological Survey of Canada for 1849 and 1850, made by W. E. Logan, esq., provincial geologist, (the analytical part of which was performed by T. S. Hunt, esq.,) contains the following among other analyses of soils. First sample is taken from a rich clay soil, having an unusual quantity of vegetable mould; the original forest was maple, elm, and birch:

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* The London Gardener's Chronicle of April 19, 1851, after stating that 18,000 tons of guano were imported in 1850 more than the year previous, adds: "Mr. Way has demonstrated, in the Journal of the Agricultural Society, that the money value of a ton of good Peruvian guano was in 1849 £12 2*s.* 5*d.*; the ammonia being worth £9 14*s.*, the phosphate of lime £1 13*s.* 9*d.*, and the potash 14*s.* 8*d.*"

When wheat is worth 5*s.* a bushel, a pound of ammonia is worth 6*d.* for making a bushel of wheat. A pound of bone earth is worth about a cent and a half, and one of potash over six cents.

Sand	49.2
Clay	23.4
Vegetable matter	20.8
Water	6.6
	100.0

One hundred parts of this soil gave to hydrochloric acid:

Alumina	4.320
Oxide of iron	3.240
Lime (part carbonate)	1.033
Magnesia (part carbonate)	.749
Potash	.435
Soda	.795
Chlorine	.080
Sulphuric acid	.144
Phosphoric acid	.557
Soluble silica	.075

The quantity of ammonia is not stated; but, as the organic matter is large, there is doubtless a fair supply of this element of fertility. The above is an excellent soil. Wheat growing upon it would be subject to fall and to rust, from the lack of soluble silica or flint, and from the excess of mould. In a good climate, it would be remarkable corn land. Owing to the excess of organic matter, an acre of this soil a foot in depth would weigh not much over 1,000 tons. In that quantity, there would be over ten tons of lime; seven of magnesia; four of potash; nearly eight of soda; sixteen hundred pounds of chlorine; about one and a half ton of sulphuric acid, (oil of vitriol;) five and a half tons of phosphoric acid; and fifteen hundred pounds of soluble silica. One hundred parts of this soil gave to distilled water .786 of soluble matter, principally organic. By burning, it left .104 of alkaline ash. 100,000 parts of this ash gave 8 of chlorine, a small portion of nitrates, and a trace of sulphates.

The soluble bases were potash and soda, lime and magnesia. The next sample of soil analyzed was at the other extreme in point of vegetable matter, containing "but a trace." Rough analysis gave:

Sand	56.0
Pebbles	8.0
Clay	27.8
Water	8.2
	100.0

One hundred parts of this soil gave to hydrochloric acid the following substances:

Alumina	1.440
Oxide of iron	3.780
Lime	.650
Magnesia	1.036
Potash	.276
Soda	.340

Chlorine	.134
Sulphuric acid	.034
Phosphoric acid	.215
Soluble silica	.150

The above analysis shows a soil in which vegetable mould became exhausted sooner than the mineral constituents of crops. It contains less oil of vitriol (sulphuric acid) than of any other ingredient. Gypsum and clover turned in with the plough will bring up the land with good profit. Gypsum is a compound of lime and oil of vitriol. 2,000 parts of the above soil gave 1 of soluble matter, three-fifths of which was incombustible, consisting mostly of the chloride and sulphate of lime, magnesia and the alkalies. No trace of nitrates was detected. Organic substances favor the formation of nitrates. The small per centage of alumina in this soil is a defect.

Soils too poor to grow clover to any advantage in Canada, have been brought up by the aid of peas and gypsum. A similar result has been attained in the United States—a fact that should be universally known.

Soils in which alumina predominates are usually richer in the incombustible constituents of plants after the mould is consumed by excessive tillage, than such as contain but little of that mineral. The following facts stated by Mr. Hunt, at pages 81 and 82, elucidate this point: "On the farm of Major Campbell, the original layer of vegetable mould has, by long tillage, entirely disappeared. The general character of this clay seems to be nearly the same for the depth of five or six feet, except that it is a little lighter on going down—a difference, perhaps, due to the fact that organic matters have not infiltrated thus far. When brought to the surface, it breaks into hard angular fragments; but, by the influence of the weather, it crumbles down into a comparatively mellow soil—still, however, becoming hard and dry in the heat of summer. In laying out a railroad, a bank of the clay was cut down and uncovered to a depth of six feet. The surface thus exposed (denuded) was entirely free from any organic matter; but was found, after a dressing of plaster, to yield an *excellent crop of peas and clover* upon the clays, generally." 100 parts of this clay yielded to hydrochloric acid the following substances:

Alumina	12.420
Oxide of iron	7.320
Lime	.697
Magnesia	1.490
Potash	.591
Soda	.231
Phosphoric acid	.390
Sulphuric acid	.022
Soluble silica	.105

One may take the best authorities, and examine the analyses of soils in this country, England, Scotland, France, and Germany, and he will hardly find one sample in a hundred that yields so much alumina as the above. When associated with a good deal of the oxide of iron and silicious sand, it lays the foundation for an enduring and excellent soil. When combined with exceedingly fine sand and little iron, the earth becomes altogether too compact and impervious to air and water. Ex-

hausted or naturally sterile lands usually lack phosphoric acid or other essential elements. The following is a case in point, (analysis by Professor Way, consulting chemist of the Royal Agricultural Society, England:)

Water	20.56
Vegetable matter	6.17
Clay and sand	59.00
Phosphoric acid	
Carbonate of lime	5.49
Magnesia	
Oxide of iron and alumina	7.90
Potash	0.31
Soda	0.12
	100.00

The above was a "worn-out soil" on Mr. Pusey's estate, and yet it has an abundance of vegetable matter, lime, and the usual amount of potash and soda. In clay and sand, iron and alumina, the proportions are such as we find in many good soils; but as not a plant can grow without phosphoric acid, and few without magnesia, the absence of these ingredients induces sterility. Instances of this kind might be multiplied to almost any extent; but their repetition is deemed unnecessary. To suppose that one can produce a root, tuber, seed, or stem from other ingredients than such as Providence fitted for the purpose, is to assume that there is no difference between lead and gold; or that an atom of water and one of iron are the same thing. Finding, as we do, many different elementary bodies in all fertile soils and in all cultivated plants, and that they are the same in both, it is alike unphilosophical in science and unsafe in practice to assume that any one mineral can perform the functions of other minerals in the economy of plants and animals. We may be profoundly ignorant of the office performed by an atom of lime, iron, sulphur, carbon, phosphorus, chlorine, nitrogen, potash, or magnesia, in any of the phenomena of vegetation or animal life; yet direct experiment and universal experience have proved the necessity of having all these substances in the soil, as well as silica in a soluble form, before it can be productive of cereal and other valuable plants. As a general truth, it may be stated that land which will bear good crops of wheat, will also yield all other crops adapted to the climate. Hence, to study the composition of wheat plants when ripe, will lead us at once to all the essential elements of fertility. In 100 parts of wheat nearly 98 are combustible; in straw, from 90 to 96 per cent. is also combustible. The combustible or organic part of wheat has the following composition, (Boussingault:)

	Grain.	Straw.
Carbon	46.10	48.48
Hydrogen	5.80	5.41
Oxygen	43.40	38.79
Azote (nitrogen)	2.29	.35
Ash	2.41	6.97
	100.000	100.000

The greatest difference in the combustible part of wheat and straw is in azote, or nitrogen, which is regarded as the flesh-forming element in the plant. One must multiply the nitrogen in wheat-straw by 7 to give as much as there is in wheat. Hence, if a wheat grower had to rely on decaying straw for nitrogen to form his grain, it would require 700 pounds of straw to make 100 of wheat. If he depended on clover or peas, the case is widely different, as their organic analysis indicates:

	Pea-straw.	Clover-hay.
Carbon	45.80	47.40
Hydrogen	5.00	5.00
Oxygen	35.57	37.80
Azote (nitrogen)	2.31	2.10
Ash	11.32	7.70
	100.00	100.00

It will be seen that pea-straw, or haulm, contains as much nitrogen as wheat; and when timely cut and properly cured, it makes the best of hay and the best of manure. Clover contains a fraction less nitrogen, but is nearly equal as forage and for manure. By regarding carbon as charcoal, and oxygen and hydrogen as one form of water, we may proceed to consider the inorganic, mineral, or incombustible part of wheat and other crops, in their relation to the soil. The ash left on carefully burning the seeds and stems of cultivated plants is not perfectly uniform in its chemical composition in all varieties of wheat or straw grown on different soils in different seasons and climates. The variations, however, are no greater than one might reasonably expect under the influence of a change of circumstances. The ash, or incombustible part of the plants, resembles the bones in animals. A poor animal, like a very lean pig or horse, has a larger per cent. of earthy matter in its system than a fat one—that is to say, his bones will bear a greater proportion to the weight of the whole carcass. Plants of the same species yield unlike quantities of starch, sugar, oil, gum, albumen, gluten, and other (so-called) protien compounds. The incombustible earthy matter in them differs in an equal degree. The following table contains the results of an analysis made by Professor Way of Hopeton wheat, (ash,) which is near an average of some 60 performed by that chemist at the Royal Agricultural College, Cirencester, and published in the journal of the Royal Agricultural Society, vol. 8, p. 624:

Silica	2.28
Phosphoric acid	45.73
Sulphuric acid	0.32
Carbonic acid, none.	
Lime	2.06
Magnesia	10.94
Peroxide of iron	2.04
Potash	32.24
Soda	4.06
Chloride of sodium	0.27
	99.94

The reader will see in the foregoing all the elements of fertility named in the preceding pages, as shown in the analysis of productive soils. By taking the results of the 60 analyses of the ash of wheat together, it will be found that *the amount of lime in the seed of this plant is about one-third as large as the amount of magnesia, and one-tenth that of potash.* The phosphoric acid is larger at all times than any other substance, and is chemically combined with lime, potash, magnesia, and with soda when present, as it generally is, but in less quantity than in the foregoing table. The silica is confined to the cuticle, or bran, and varies from 1 to 8 per cent. The amount of sulphuric acid is small, as is that of chloride of sodium, or common salt. The iron, set down at over 2 per cent., is unusually large.

The following is the mean of several analyses of the ash of wheat performed by Boussingault:

Phosphoric acid	47.00
Sulphuric acid	1.00
Silica	1.30
Potash	29.50
Lime	2.90
Magnesia	15.90
Chlorine, traces.	
Soda, traces.	
Oxide of iron, none.	
Charcoal and loss	2.40
	100.00

Although no iron appears in the above, yet, when searched for critically, Boussingault did not fail to find it; but as nearly all soils abound in this element of crops, no one is under the necessity of applying copperas, or other salt of iron, to his land as a fertilizer. The reader will see that the per cent. of potash is ten times larger than that of lime, and that magnesia is more than five times as abundant. The best natural wheat soils in the Genesee valley yield a good deal of magnesia and potash on analysis. The ash of wheat-straw has the following composition:

	Per cent.	Removed from an acre.
Silica	69.94	107 lbs. $5\frac{5}{10}$ ozs.
Phosphoric acid	8.53	13 $1\frac{6}{10}$
Sulphuric acid	2.33	3 $9\frac{1}{10}$
Carbonic acid, none.		
Lime	4.94	7 $9\frac{2}{10}$
Magnesia	1.43	2 3
Peroxide of iron	0.06	0 $5\frac{1}{10}$
Potash	12.48	19 $2\frac{4}{10}$
Soda	0.25	0 $5\frac{5}{20}$
Chloride of sodium, none.		
	99.97	153 $5\frac{3}{10}$

This crop was at the rate of 30 bushels per acre, and the grain contained $3\frac{3}{10}$ pounds ash, which, added to that in the straw, gave $186\frac{3}{10}$

pounds as the incombustible minerals taken from an acre in a single crop. It is worthy of particular attention that over 100 pounds of soluble flint, or silica, are required to form an acre of wheat straw. Too little attention has been paid to this substance by the wheat-growers of the United States.

A judicious rotation of crops favors the accumulation of soluble silica in the soil, and how this result is attainable every farmer should understand. The system consists in making a wise use of all the silica contained in all straw, cornstalks, and hay grown on the farm, and in increasing the solubility of the finest particles of silicious sand in the soil. The former is simply a matter of good husbandry, *i. e.* carefully saving all straw, stalks, and grass or hay, or the manure derived from the same. There are farmers in England who make land, which is naturally poor, yield an average of 36 bushels of wheat per acre, take one year with another. In this operation straw, hay, and turnips supply most of the raw material for making so large an average yield of wheat. The solubility of flint sand, or silica, is increased by the aid of potash and soda. When these alkalies combine with silica in small quantities, insoluble silicates are produced, like common glass; but, if glass be ground fine and boiled in a concentrated solution of potash or soda, it will be dissolved in the water, the silica having combined with a large amount of the alkali. Wood ashes and salt, abounding in potash and soda, have been found by experience valuable fertilizers for wheat; and even salt and lime, or salt alone, will greatly benefit the crop, as many wheat-growers in western New York have demonstrated. One reason why peas, beans, and clover rotate so successfully with wheat, is, that these crops extract comparatively very little silica from the soil, and of course leave the more for cereals.

Composition of peas and beans on clay soil.—Analyses by Professor Way.

	1 ton of peas.	1 ton of beans.	2,989 lbs. of pea straw.	2,270 lbs. of bean straw.	Entire crop peas.	Entire crop beans.
Silica	0.42	0.22	4.62	2.95	5.04	3.17
Phosphoric acid	14.43	15.23	2.93	0.55	17.36	15.78
Sulphuric acid	2.93	1.62	5.38	1.58	8.31	3.20
Lime	2.28	2.75	86.80	22.25	89.08	25.00
Magnesia	3.48	3.66	13.62	2.85	17.10	6.51
Protoxide of iron	.....	.....	1.74	0.69	1.74	0.69
Potash	20.75	27.40	30.18	36.96	50.93	64.36
Soda	2.51	0.28	0.57	3.13	3.08	3.41
Chloride of sodium (salt)	2.15	.....	23.00	13.88	25.15	13.88
Total	53.15	51.16	168.84	84.84	207.79	136.00

It will be seen by the above figures that a ton of peas (2,240 pounds) and 2,989 pounds of pea straw contain only 5.04 pounds of silica, and beans still less. Hence, an acre of arable land might yield a crop of 5,229 pounds of peas one year, and one of 4,510 pounds of beans the

next, and not part with 8½ pounds of silica in the two crops. Pea straw consumes a large amount of lime and considerable potash. Land should be well stocked with lime for these crops. 3,693 pounds of perfectly dry clover gave Boussingault 284 pounds of ashes, equal to 7.7 per cent. In these ashes, or, more properly, in this ash, there were 18 pounds phosphoric acid, 7 pounds sulphuric acid, 7 pounds chlorine, 70 pounds lime, 18 pounds magnesia, 77 pounds potash and soda, 15 pounds silica, and 1 pound oxide of iron. To the foregoing must be added 71 pounds carbonic acid, to make the aggregate 284 pounds. In the way that Boussingault burns clover, the ash contains 25 per cent. of carbonic acid. It will be seen that this plant, like peas and beans, draws slightly on the soil for soluble silica, but largely for the alkalies and lime. Scientific farmers realize great benefit in growing clover and beans in connexion with wool-growing and wheat-culture, because the first-named plants send down their roots in a permeable soil to a great depth, and bring up phosphates, sulphates, and chlorides of lime, potash, and magnesia, which are ultimately consumed in forming generous crops of wheat.

The writer has frequently traced the roots of clover and beans to the depth of 34 inches into the earth in sandy and loamy soils. *Subsoiling and root-culture* are profitable operations, when conducted on scientific principles. Care should be had that there is not an excess of moisture in the subsoil. Draining is the only remedy for this evil. The capacity of soils to take up and retain water without injury to crops by its excess, and the temperature of soils at different depths and under different circumstances, will be noticed before the close of this essay. The reader's attention is now invited to the minerals taken from the earth in the growth of potatoes, turnips, and carrots, which, under a good system of husbandry, are valuable crops.

About three-fourths of the weight of potatoes when dug are water; of the other fourth, twenty-four parts in twenty-five are combustible—the other part being ash. Estimating his crop at its dry weight, an acre gave M. Boussingault 2,828 pounds of tubers, which yielded 113 pounds of ash—consisting of 13 pounds of phosphoric acid, 8 pounds sulphuric, 3 pounds chlorine, 2 lime, 6 magnesia, 58 potash and soda, 6 silica, 8 carbonic acid, and 1 pound oxide of iron. It will be seen that more than half of the ash of potatoes is pure potash, for it contains but a trace of soda. Dry potato tops yield 6 per cent. of ash. An acre (in which the growth of vines or tops must have been unusually large) gave to M. Boussingault 5,042 pounds dry weight, and 303 pounds ash—consisting of 33 pounds phosphoric acid, 7 sulphuric acid, 4 chlorine, 7 lime, 5 magnesia, 135 potash and soda, 39 silica, 16 oxide of iron, and 57 carbonic acid. Taking the figures as they stand, there are few so exhausting crops as that of Irish potatoes *(tuberosum solanum)* when entirely removed from the soil. In the tops and tubers 416 pounds of incombustible matter are removed from an acre. Twenty bushels of wheat require 12 pounds of phosphoric acid for the grain, and 5 pounds for the straw; while an acre of good patatoes demands 13 pounds of this acid for the tubers, and 33 for the haulm or tops. This is equal to two large crops of wheat. In an acre of potatoes 193 pounds of potash are consumed: one-sixth of that amount answers for an acre of wheat. Few farmers supply their growing patatoes with a sufficient quantity of potash and phosphoric acid.

Hence this plant and its tubers have become constitutionally deteriorated on most farms, and extremely prone to premature decay.

Professor Way gives the following figures to indicate the minerals required by nature to form twenty tons of bulbs and four tons of tops of the following root-crops:

	Turnips. lbs.	Mangelwurzel. lbs.	Carrots. lbs.
Phosphoric acid	45	21	39
Sulphuric acid	50	22	57
Lime	90	21	197
Magnesia	14	22	29
Potash	140	130	134
Soda	33	70	103
Chloride of sodium	57	160	85
	429	446	644

The above figures appear large; but it must be borne in mind that a crop of 24 tons of 2,240 pounds to the ton is also large for an acre—at least it would be so regarded in this country. Roots require rich land to do well; and in turn they yield a large amount of fertilizing elements. It will be seen that 24 tons of carrots consume 197 pounds of lime, and 287 of potash and soda, besides 85 of common salt (chloride of sodium.) The large demand for phosphoric and sulphuric acids is also worthy of note.

The most successful improvers of soils and grain-growers in the world produce a vast quantity of roots, and mainly with a view to augment the stock of manure on the farm. The organic matter which 24 tons of roots furnish is immense; but many believe that the price of labor is too high, grain too low in the United States, and virgin lands too cheap, for the profitable adoption of the English system of husbandry. Before one can wisely adopt any system of farming, he must learn the natural capabilities of his soil, the elements of crops which he can command at the lowest price, and the cost of producing each article that the market calls for, as well as the probable compensation he is to receive for the same. Among the elements of production, *temperature* and *humidity* deserve the most careful consideration. The temperature of soils at different depths below the surface has been very little studied in the United States. Professor Emmons has made observations at Albany for twenty months, which are published in the second volume of his valuable work on the agriculture of New York, from which we condense the following:* From May 14th to 22d inclusive, 1847, mean temperature at the surface of the soil on grass land, at 5 o'clock a. m., was 48°. At four inches below the surface it was $53\frac{1}{3}$°; at nine inches below, 55°. At noon, the temperature at the surface was 85°; four inches below, $82\frac{1}{4}$°; nine inches below, 57°. At 7 p. m., at the surface the heat was $77\frac{3}{8}$°; four inches below, $69\frac{3}{8}$°; nine inches, $59\frac{3}{4}$°. Four feet above the surface the temperature at the times above named was $49\frac{7}{8}$° at 5 a. m.; $68\frac{3}{8}$° at noon; 65° at 7 p. m. The above

* Albany is in latitude 42° 39′. Mean annual temperature 48° 47′ at 130 feet above tide. Observations made 100 feet above tide.

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figures reveal the interesting fact that the mean temperature was 20° higher at the surface than four feet above it, at noon; while the soil four inches below the surface at that time of day was 17¼° warmer than the air four feet above the ground. At nine inches in depth the mean is 10° below that of the air four feet above the surface. At 7 o'clock p. m. the temperature is 2° higher than at noon.

From 23d to 31st of May inclusive, the record is as follows: Mean heat at the surface 52⅛°, four inches below 55½°, nine inches below 56⅞°, at 5 o'clock a. m. These figures show a regular cooling of the soil during the night-time from the surface to the depth of nine inches. At noon, at the surface, the temperature was 68½°; four inches below, 61⅔°; at nine inches below, 58⅔°.* At 7 p. m., at the surface, the mean was 62⅓°; four inches below, 61⅛°; nine inches below, 59⅓°. During the same period the mean heat four feet above the surface at 5 a. m. was 54°; at m., 65⅞°; at 7 p. m., 63⅓°. These figures indicate cooler weather than one would expect between the 23d and 31st of May, even at Albany.

From the 1st to the 7th of June, inclusive, the mean at the surface on grass land was, at 5 a. m., 54⅝ degrees; at 4 inches below the surface, 57⅜; at 9 inches, 58. At noon, at the surface, the temperature was 74⅜; at 4 inches below, 64¼; 9 inches below, 59¼. At 7 p. m., at the surface, 63; 4 inches below, 64⅜; 9 inches below, 60⅞. At the period above referred to, the mean temperature of the air 4 feet above the surface was, at 5 a. m., 53⅞; m., 66⅞; 3 p. m., 69¾; 7 p. m., 64⅛. From 8th to 14th June, the mean temperature, at 5 a. m., at the surface of grass land, was 61; at 4 inches below, 60; 9 inches below, 60½. At noon, the average was 69 at the surface, 66 four inches below, and 64½ nine inches below. At 7 p. m., the thermometer gave a mean of 67 at the surface. In the air 4 feet above the surface, at 5 a. m., the heat was 65⅝; at m., 77¾; at 3 p. m., 78¾; at 7 p. m., 73⅛.

The soil attained its maximum temperature in the third week of July, at the depth of 9 inches, being 75¾ degrees. 81 degrees was the maximum mean at the depth of 4 inches, on grass land; and 85 at the same depth on naked soil.

In the fourth week of July, the mean at 9 inches below the surface was near 72 degrees. In this week, the mean, at 5 a. m., 4 feet above the surface, was 65⅛; at m., 73⅝; at 3 p. m., 70¾; at 7 p. m., 69⅛.

During the first week in August, the mean temperature of the soil at 9 inches below the surface was 71½ degrees. The mean 4 feet above the surface was 72.

During the second week, the mean at 9 inches below the surface was 73 degrees, being 1½ higher than the preceding one. The mean in the air 4 feet above the surface was 75½.

The third week gave a mean of 71¼ degrees at the depth of 9 inches in the soil; while the mean 4 feet above it was 69.

In the fourth week, the soil had a mean of 70½ degrees at the depth of 9 inches.

The temperature fell to a mean of 64½ degrees at the same depth during the first week in September.

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*This footing is wrong in the table in the quarto volume from which we copy. The mean is there stated at 68⅝°. It should be 58⅔°.

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The mean of the second week was 64 degrees; of the third, 62½; fourth, 59½.

In the first week in October, the soil at 9 inches had a mean heat of 58 degrees; in the second week, of 55; in the third, of 52½; in the fourth, of —. (*Note.*—This table is defective.)

At 2 feet below the surface, the temperature of the earth in Albany fell from 40 degrees on the 1st of January, 1848, to 34 on the 31st of that month; and at 4 feet below the surface, the change in the same length of time was from 43 to 37.

In the month of February, at the depth of 2 feet, the reduction in temperature was from 34 degrees to 32; and at 4 feet, from 37 to 35½.

In the month of March, the earth at 4 feet was cooled 1 degree, or to 34½; at 2 feet, the variation was very slight.

During the first fifteen days in April, the temperature at the depth of 2 feet increased 11 degrees, or from 33 to 44; in the last fifteen days in April, the increase was from 44 to 47½.

During the thirty days in April, the earth at 4 feet in depth had its heat increased from 34¾ degrees to 46.

During the thirty-one days in May, the earth at the depth last named had attained a temperature of 54½ degrees; at 2 feet, it was 58½; at 9 inches, it was 60½; and at 4 inches, 3 p. m., it was 62.

From the foregoing observations, it is obvious that the four months of June, July, August, and September furnish the warmest soil, to the depth of 2 feet, for the production of corn, in the northern States. There are many circumstances that modify the temperature of soils, such as being open, and permitting either warm or cold water to descend freely to a considerable distance into the earth. Standing water being a bad conductor of heat, a wet, compact clay soil may have boiling hot water poured upon it in large quantities without heating either the water or ground below the surface to any depth. Solar heat encounters equal difficulty in penetrating a wet, compact clay, from the surface of which water evaporates and carries off much heat in a latent form. Different soils absorb unequal quantities of water, and retain it with unequal force. Dr. Sprengel, in his valuable work on soils, truly remarks that "the power of the earth to take up and hold back more or less water, mechanically, in its pores, is of the greatest importance for vegetation, not only because the water in and of itself contains the life of plants, but especially, also, because it carries to them means of nutriment from the soil." In the *want* or *excess* of moisture we frequently must seek the cause of the unfruitfulness of the earth. The capacity of the soil to hold moisture,* but especially the decompositions and combinations which take place, are of importance, since the decomposition of organic matter may be prevented either by an excess or the want of moisture.

The following table contains the results of experiments made by Professor Schubler, with such soils as usually come under the notice of the agriculturist:

* We have tried swamp muck, or peat, which, when perfectly dry, would take up, without dripping, four times its weight of water.

Kinds of earth.	Power of containing water.		A cubic inch contains—		A cubic ft. contains—
	According to weight.	According to volume	Grains of water.	Cubic lines of water.	Pounds of water.
Silicious sand	25 per ct.	37.9 per ct.	121	655	27.3
Calcareous sand	29 "	44.1 "	141	763	31.8
Gypsum powder	27 "	38.2 "	122	660	27.4
Fine lime	85 "	66.1 "	211	1,142	47.5
Lime, precipitated	47 "	54.5 "	174	941	39.1
Fine magnesia	25.6 "	76.1 "	242	1,316	62.6
Sandy clay	40 "	51.4 "	164	888	38.8
Loamy clay	50 "	57.3 "	183	991	41.4
Stiff clay, or brick earth	61 "	62.9 "	201	1,088	45.4
Pure gray clay	70 "	66.2 "	212	1,145	48.3
White pipe-clay	87 "	66 "	211	1,142	47.4
Humus	181 "	69.8 "	223	1,207	50.1
Garden mould	89 "	67.3 "	215	1,164	48.4
Arable soil	52 "	57.3 "	181	980	40.8
Slaty marl	34 "	49.9 "	158	863	35.6

From this table we obtain the following general results:

1. The sands have the smallest power of containing water, whether they are compared in weight or in volume with the other earths.

Silicious or flint sand has the least power of them all—the sands, moreover, differing according to the fineness of their grains. The finer the grains and particles, like precipitated lime, fine clay, and magnesia, the more water is taken up by the earth. Thus white pipe-clay absorbs 87 per cent. of its weight and 66 of its volume of water, while common silicious sand takes up only 25 per cent. of water by weight and 37.9 by volume. Coarse sand imbibes, when saturated, only 20 per cent. of water.

2. Gypsum powder very nearly approaches the sands in its hygrometric properties, taking up but 27 per cent. by weight, while fine lime absorbs 85 per cent. In this case the lime is specifically much lighter as well as finer. The lightness of fine magnesia is well known; hence the large per cent. of water absorbed by it. The same remarks will apply to humus, or pure mould.

3. It will be seen that 100 parts of arable soil take up 52 per cent. of water in weight, and over 57 in volume.

4. Slaty marl has a less capacity for containing water than one might infer from the fineness of its particles; it is, however, about 50 per cent., according to volume.

5. The large amount of water that a cubic foot of earth is able to hold, is worthy of note. We suspect that magnesia is rated too high. It is stated at 62.6 pounds per cubic foot, which is as much water as a cubic foot contains without any magnesia whatever. A cubic foot of common arable soil will hold over 40 pounds of water. The proportion of water which evaporates from the surface of leaves and the ground, and the proportion that penetrates the earth to appear again elsewhere as springs, and the part that runs off immediately from the surface when it rains, or soon after, are facts that have not been studied except to a very limited

extent. Considerably more water will evaporate even in the cool and damp climate of England from an acre of land than falls upon it, provided the earth is kept saturated all the time. One of the advantages of trenching—that is, of digging up the soil and sub-soil to the depth of 18 or 20 inches over a whole field—is the increased quantity of water it will contain, and not be too wet for the healthy growth of cereal and other crops. On soils thus treated, they seldom suffer from drought, the supply of moisture from below being so enduring. Deep ploughing and sub-soiling operate in a similar manner, only less in degree.

The drying of soils.

Kinds of earth.	Ease of drying.		
	Of 100 parts of water absorbed, was evaporated in 4 hours, at 67° Fahrenheit—	Of 100 parts of water absorbed, 90 parts evaporated at 67° Fahrenheit, in—	
		hours.	min.
Quartz sand	88.4 parts.	4	4
Lime	75.9 do	4	44
Gypsum in earthy form	71.7 do	5	1
Stratified clay	52.0 do	6	55
Loamy clay	45.7 do	7	52
Pure gray clay	31.9 do	11	17
Cabonate of lime in fine state	28.0 do	12	51
Carbonate of magnesia in fine state	10.8 do	33	20
Humic acid	20.5 do	17	33
Loamy soil	32.0 do	11	15

On the drying of the deep layers of the soil in a longer or shorter time, the different looseness or consistency of the upper soil has also an important influence. Fine clay, for example, at 2 inches thickness, has a moist surface long after the surface of peaty soil is dried up at an equal depth.

If a soil contains many salts, particularly such as deliquesce, i. e., attract moisture from the atmosphere sufficient to dissolve them, like pearl-ash and common salt in damp places, it is characterized by peculiar hygroscopic power. All earths attract more moisture by night than by day; they also give back, through evaporation in the sunlight, the moisture absorbed at night. Schubler remarks: "In order to ascertain how much moisture one kind of soil will absorb from the air, we laid a certain quantity of finely pulverized and fully dried earth on a plate, which was put under a glass bell made water-tight, and permitted to lie there 12, 24, to 48 hours, in a moderate temperature, (from 59° to 67° Fahrenheit,) and then weighed. The gain in weight shows the amount of water absorbed."

The following results were obtained in the manner indicated:

Kinds of earth.	100 parts of dry earth absorbed in—			
	12 hours.	24 hours.	48 hours.	72 hours.
Quartz sand	0 parts.	0 parts.	0 parts.	0 parts.
Lime sand	2 "	3 "	3 "	3 "
Gypsum	1 "	1 "	1 "	1 "
Carb. lime in powder	26 "	31 "	35 "	35 "
Carb. magnesia in powder	69 "	76 "	82 "	82 "
Potter's clay	21 "	26 "	28 "	28 "
Loamy clay	25 "	30 "	34 "	35 "
Pure gray clay	37 "	42 "	48 "	49 "
Humic acid	80 "	97 "	110 "	120 "
Plough-land and corn soil	16 "	22 "	23 "	23 "

In commenting on the above table, Professor S. pertinently calls attention to the fact that "gypsum attracts scarcely no water from the air. But it is usually believed that gypsum employed as a manure especially promotes vegetation by attracting moisture from the atmosphere, which it transmits to plants. *Thus theories which are written down often fall to nothing when tested by experiment.*"

It is to be hoped that American farmers will soon see the importance of encouraging accurate experiments in the science as well as the practice of agriculture, and no longer dignify mere *theories* or *surmises* with the name of agricultural science.

Truth in the science, like truth in the art of tillage and husbandry, can only be established by numerous and reliable experiments.

The shrinkage of different soils in drying is thus given by this indefatigable worker. 1,000 cubic lines were reduced to the following dimensions:

Quartz sand	0 (i. e., no reduction.)
Potter's clay	940
Loamy clay	911
Pure gray clay	817
Humic acid, (mould)	800
Carbonate of lime, as powder	950
Plough-land, loam soil	880

This table shows that the decrease of the volume of earth stands in direct proportion with its power of retaining moisture. The unequal contraction of earths in drying is a curious phenomenon, and produces the crumbling of clays, loams, and all compound soils, when turned up by the plough or spade.

According to Schubler's experiments, the following are the results as to the capacity of different earths to retain warmth for a longer or shorter time:

Kinds of earth.	Power of retaining warmth, that of limestone sand being fixed at 100.	Length of time which 30 cubic inches of earth need, at a temperature of 62° Fah., to cool from 145 to 70°.
Limestone sand	100	In 3 hours and 30 minutes.
Quartz sand	95.6	3 do 20 do
Gypsum earth	73.8	2 do 34 do
Potter's clay	76.9	2 do 41 do
Loamy sand	71.8	2 do 30 do
Pure gray clay	66.7	2 do 14 do
Carb. magnesia	38.0	1 do 20 do
Carb. lime	61.0	2 do 10 do
Humic acid	49.0	1 do 43 do
Plough-land loam	70.1	2 do 27 do

From the above table, it appears that limestone sand, and next quartz sand, excel all other soils in retaining warmth. In many climates this is an advantage of great importance. Black mould (humic acid, or humus) radiates heat with the greatest rapidity. Hence peaty soils, although sufficiently dry, being soonest cooled down to the freezing point, are the first to experience a frost in autumn. Carbonate of magnesia radiates heat with greater facility than mould, but no one meets with a soil all, or nearly all magnesia; hence the radiating power of that mineral has little practical importance. In mixing soils to improve their texture and chemical properties, it is found by experience much better economy to add clay to a light leachy sand, to impart strength and tenacity to the soil, than to apply sand to stiff clay to render it more friable and porous. Experience of this kind gave rise to the old English doggerel maxims:

"Clay upon sand
Makes land;
Sand upon clay
Throws money away."

Little land has been "made" in this country by adding a top-dressing of clay to sand; but in many localities the operation will pay well. The clay should be dug from the richest deposite within reach, and dried to diminish its weight before it is hauled and spread. 100 tons will cover an acre an inch in depth, which will permanently improve any soil, whether sand or gravel, that is too porous and leachy. It is only, however, where land is valuable that one can safely incur the expense of putting 100 tons of clay upon an acre; and the labor should be performed at times when the farmer has least work on hand for his teams, hired men, or servants. It is so much cheaper to grow crops on a soil that holds manure and other fertilizers well, than on a loose sand or gravel, that the skilful mixing of earths will pay better than one might at first suppose. Where lime can be had at a reasonable rate, it may be used as clay. This mineral is lacking in a large portion of the land under cultivation in the United States; but the misfortune is, that in sections where there is least lime in the soil, it is too expensive to apply an amount that will

equal one per cent. of the mass, estimating the earth to the depth of ten inches. As the soil to this depth weighs 1,000 tons, it will take ten tons of slaked carbonate of lime, or six of caustic lime, to the acre, in case the earth lacks this mineral, to form one per cent. in the soil. There are very few soils on the limestone lands in western New York that contain so much as two per cent. of lime. The writer has analyzed a great many of the soils that overlie limestone rocks famous for producing good wheat, and he has found more that contained less than one per cent. of lime than that had over that quantity. A soil may, however, possess 30 or 40 per cent. of this substance and still be productive. If it were quick-lime, a much smaller amount would be fatal to vegetation; but as common lime (carbonate) is insoluble in pure water, requiring the presence of carbonic acid, or some other, to dissolve it, not enough of this alkaline earth is ever dissolved in its mild state to injure crops. On the chalk lands of England and extensive marl deposites in this country, the fact has been abundantly demonstrated that the carbonate of lime is not otherwise injurious than in taking the place of soluble silica, potash, chlorine, or other elements of cultivated plants.*

CHAPTER V.

THE PHILOSOPHY OF IMPROVING SOILS.

It is a grave mistake to suppose that all soils can be improved with equal facility and profit. The best way to impart a high degree of fertility to any given area of earth, is a problem often very complex and difficult of solution. In some cases a little gypsum scattered broadcast over a clover or pea field, operates like magic to increase the crop; in others, this fertilizer produces no effect whatever. The same is true of bone-dust, common salt, lime, and potash. More compound fertilizers, like the dung of sea-birds, called *guano*, and stable manure, seldom, if ever, fail to improve the productiveness of land for one or more crops. Why this difference in favor of the latter?

While lime adds to the soil only one element, the excrements of domestic animals applied to it contain not only lime, but some twelve or fourteen other ingredients equally necessary to form cultivated plants. Now, unless a part of a thing is equal to the whole, the excrements of animals, no matter whether of birds, swine, sheep, neat cattle, or of the human species, must ever be more reliable to augment the productiveness of the earth than any one, two, or three simple elementary bodies, consumed in the formation of any crop. When a part of the necessary ingredients are present in the soil in an available condition, then the addition of the lacking ingredients, whether few or many, will effect the desired purpose. While this statement is strictly true, it does not militate in the least against the use of lime, bones, gypsum, salt, marl, greensand, and other popular fertilizers, whenever and wherever it can be done at a profit.

*Earths that contain a large amount of chalk or other calcareous matter are commonly very porous and dry, and support a feeble and stunted vegetation. Treading the surface with sheep, rolling it, and applying clay, are the principal remedies used on the chalk downs of England. Georgia contains a little, and Alabama a considerable area of land where there is an excess of calcareous mineral. Those that desire to study the economical value of lime in the Atlantic slope of the United States will find a vast fund of useful information in an extended "Essay on Calcareous Manures," by Edmund Ruffin, esq., of Virginia.

In the very nature of the case, experiment or personal experience must decide this question for the farmer. Science can do no more for him than to establish general and correct principles to guide his practice and researches. But the agriculturist should weigh carefully all the facts that science and the large experience of thousands of other cultivators of the soil have recorded for his instruction and benefit.

In an able and interesting address before the Maryland State Agricultural Society, delivered at its third anniversary exhibition in October, 1850, the Hon. Willoughby Newton, of Virginia, gave the following as the results of his experience in the use of guano:

"In the effect of *guano*, especially the Peruvian, I have never been disappointed. I have used it now for four years with entire satisfaction, having each year been induced to enlarge my expenditure, until last year it reached $800; and for the crop of wheat this fall it exceds $1,000. I have observed with astonishment its effects in numerous instances on the poor 'forest land,' alluded to in a former part of this address. What the turnip and sheep husbandry have done for the light lands of Great Britain, the general use of guano promises to do for ours. Lands a few years ago deemed entirely incapable of producing wheat, now produce the most luxuriant crops. From 15 to 20 bushels for one sown, is the *ordinary product on our poorest lands from the application of* 200 *pounds of Peruvian guano.* I may remark, that it is not usual in eastern Virginia to sow more than a bushel of wheat to the acre; and that I deem amply sufficient."

We regret that Mr. Newton does not state what quantity of wheat this "poorest land" in eastern Virginia would yield without guano or manure of any kind. In the absence of such information, it is probably safe to assume that 5 bushels are about the average; if so, the gain is from 10 to 15 bushels by the use of 200 pounds of Peruvian guano. It is a philosophical question of great practical importance in farm economy to solve, *In what way does nature operate* to make 200 pounds of manure produce 15 bushels of wheat, including, of course, the plants that bear this amount of seed?

Science, associated with practice, enables us to answer this question in a clear and satisfactory manner. Assuming the highest gain, or 15 bushels, the weight of that amount, at 60 pounds per bushel, is 900 pounds. From this 12 per cent. must be subtracted for water in merchantable wheat, which reduces the quantity to 792 pounds. Of this, 95 per cent., in round numbers, is water or its elements oxygen and hydrogen, and carbon or coal. The other 5 per cent. is organized nitrogen and incombustible matter, called ash. This 5 per cent. is nearly 40 pounds in weight, and similar in every respect to the elements contained in the guano applied to the soil. If we may safely assume that growing wheat-plants can obtain most of their carbon from the carbonic acid in the atmosphere, and water from the same source, there is no difficulty in understanding how 200 pounds of a highly concentrated manure should supply 40 pounds of raw material for making this grain, and have 160 left for the benefit of the straw. To yield 900 pounds of wheat, requires from 1,200 to 1,800 of straw and chaff. As guanoed wheat usually contains less straw in proportion to the grain than wheat grown on ordinary rich land, probably 1,500 pounds of straw and chaff are a fair estimate to 900 of seed. Of the combustible part of this straw and chaff, over 99

parts in 100 are carbon and the elements of water. The amount of nitrogen in straw is about one-third of one per cent. Guano supplies nearly all the wants of the stems of wheat-plants in minerals, except soluble silica or flint. Potash is sometimes lacking in this fertilizer to a degree that impairs its value for growing wheat. As a crop of wheat is not taken year after year from the light sandy soils in Virginia and Maryland, soluble silica has an opportunity to accumulate to some extent between the large demands on the soil for this element. The power of wheat, corn, oats, and other cereal grasses, to extract carbon from the atmosphere, is one of the most pregnant facts in practical agriculture. If the essential elements of grain can be so much concentrated that 200 pounds of manure will produce 900 of wheat, *the fact* is of inestimable importance to the human family, and especially to all owners of arable land, no matter how sterile it is by nature or poor by excessive cropping. Anxious to encourage investigations in this direction, we copy a few additional remarks from Mr. Newton's address:

"I applied last fall $350 worth of guano, partly Peruvian and partly Patagonian, on a poor farm in 'the forest,' which cost a few years ago $4 an acre, and reaped 1,089 bushels from 78 sown. Forty-six were sown on a fallow, (both guano and wheat put in with a cultivator, followed by a heavy harrow,) and yielded 790 bushels, or over 17¼ per acre for one of seed. A considerable part of this was dressed with Patagonian guano, and was much inferior to the other portion. A lot on which 15 bushels was sown, and dressed with Peruvian guano, was thrashed separately, and yielded 301 bushels, or over 20 for one. The cost of the farm was $1,520, and I have good reason to expect, with a favorable season, from the crop now sown and dressed with guano, a bushel of wheat for every dollar of the prime cost of the farm. Many other instances from the use of guano equally striking have come under my immediate observation among my neighbors and friends, and I can vouch for their entire accuracy. It has been frequently objected to the use of guano, that it is not permanent. It would be unreasonable to expect great permanent improvement from a manure so active, and which yielded so large a profit on the first crop; yet, I have seen some striking evidences of its permanency in heavy crops of clover succeeding wheat, and in the increase of a crop of wheat on a second application. As an instance, I may mention that two years ago I sowed upon a single detached acre of 'forest land' one bushel of wheat, and dressed it with a barrel of African guano, costing $4, and the yield was 17 bushels. Last fall the same land, after remaining one year in clover, was again sown with one bushel of wheat, and dressed with 140 pounds of Peruvian guano, costing $3, and the product was 22 bushels; yet I would advise no one to rely upon guano exclusively. Its analysis shows that it contains salts of ammonia, alkaline phosphates, and the other mineral elements necessary to produce the grain of wheat, but is deficient in most of the elements of the straw and roots of the plants."

If the last remarks were true, the dung of sea-birds and of common domestic fowls would be less valuable than experience proves it to be. Mr. E. F. Teschemacher, of Boston, gives the following as the result of an analysis of Peruvian guano made by him: "One hundred parts con-

sist of 9 parts of ammonia, combined with phosphoric, carbonic, uric, and organic acids; forming, of

Ammoniacal salts	40
Animal organic matter	6½
Sulphate and muriate of potash and soda	11½
Phosphate of lime and magnesia	29½
Sand	1
Water	11½
	100''

While there is but one per cent. of sand or silica, and that insoluble, there is 11½ per cent. of salts of potash and soda, being about the same found in wheat straw.*

No fertilizers differ more in value and chemical composition than those imported and sold under the name of guano. We can no more judge from the analysis or practical effects of one cargo of this manure what the next will be worth, than from the composition of one man's soil in one locality what is the composition and what the value of a different soil in a distant locality. The true way to estimate the value of the excretions of any animal is to learn the nature and constituents of the food on which it subsists. The mule that lives on sedge, thistles, and bushes will yield manure vastly inferior to that of one fed on corn and oats. When a bird consumes 100 parts of dry organized fish, flesh, insects, or the seeds of plants, 80 parts, more or less, escape from its capacious lungs in the shape of carbonic acid and vapor; and 20 by the bowels, which constitute guano. It is because the food of birds is richer in the least abundant elements of plants, and their systems burn out nearly all the carbon and hydrogen in their aliment before it leaves the organs of nutrition and respiration, that the dung of this class of animals is so valuable. Every farmer knows that if 100 pounds of oats were rotted, they would form valuable manure; but how would the mass compare with 100 pounds of guano, suppose fowls had eaten oats enough to form 100 pounds of dry excrement? The composition of oats, according to Boussingault, is as follows:

Carbon	50.38
Hydrogen	6.32
Oxygen	37.14
Nitrogen	2.24
Ash	3.98
	100.00

* Professor Way has demonstrated, in the Journal of the Royal Agricultural Society, that the money value of a ton of good Peruvian guano in England in the year 1849 was £12 2*s.* 5*d.*; its ammonia being worth £9 14*s.*, the phosphate of lime £1 13*s.* 9*d.*, and the potash 14*s.* 8*d.* Ammonia is worth sixpence (11 cents) a pound for producing wheat at $1 25 a bushel; phosphate of lime is worth 1½ cent a pound, and potash about 6¼ cents, for agricultural purposes.

From a return printed by order of the House of Commons, it appears that 116,925 tons of guano were imported into the United Kingdom in the year 1850; being more than was imported in any year since 1841, excepting the year 1845, when 283,300 tons were imported.

It will be seen that nitrogen and ash or incombustible matter form only 5.22 per cent. of oats, and that 94.78 parts in 100 are carbon and the elements of water, carbon forming a fraction over half the weight of this grain.* Now, the best guano contains no more carbon than it does of nitrogen, and often not so much; but let us assume that the oxygen and hydrogen in oats are not estimated as fertilizers at all, and that guano made from the seeds of this plant contains as much carbon as the ash and nitrogen combined; then it is obvious that 100 pounds of oats will form but 10.44 of this most concentrated fertilizer; so that 1,000 pounds of oats would yield only 104.4 lbs. of guano. If a soil did not lack available carbon, oxygen, and hydrogen, but ammonia and the earthy elements of oats, who can say, in view of the chemical composition of this grain, that 105 pounds of the right ingredients might not produce 1,000 of oats? To comprehend the philosophy of improving land, the farmer must have a clear perception of the existence and condition of the two tons of matter which forms that quantity of clover, hay and roots, when 100 pounds of gypsum are applied to an acre that needs sulphur, and perhaps available lime. When a mixture of wood ashes, burnt bones, and common salt adds many thousand pounds to a crop of corn, where does all the carbon come from contained in the stalks, leaves, roots, cobs, and seeds of this luxuriant plant? Not a pound of carbon was applied in the fertilizers. In burning over prairies at the West, a thousand pounds or more of carbon from each acre are annually discharged into the atmosphere for centuries, while not an ounce is applied in manure of any kind. Instead of impairing the soil and robbing it of mould or carbonaceous matter, these prairies are remarkable for the dark color and richness of the earth. In this case, not only carbon and the elements of water are consumed in the annual burning of all vegetation, but whatever of nitrogen is contained in wild grass and other plants is also thrown into the air. Nothing but the ash remains to keep up the virgin fertility of the land, and that is sufficient for the purpose.

If these prairies had been *tilled* as well as cropped, by burning their products there is no question that the exhaustion of the soil would ensue. Tillage *alone*, by increasing the solubility and solution of all the elements of plants, both organic and inorganic, hastens their removal from ploughed land. There is vastly too much land under the plough in the United States for the crops harvested. The proportion of the elements of crops which leave the soil without entering at all the roots of plants is much greater than is generally believed. No intelligent person can long study the combustible and incombustible matter that rain-water dissolves out of an arated or frequently stirred soil, in the course of the six warmest months of the year, and not be convinced of the truth of the above remark. The leaching and washing of tilled land are to be avoided by all practicable means, if one seeks to increase its productiveness from year to year. When manure enough to produce 17 bushels of wheat on poor, sandy land can be put into a "barrel," and sold readily for "four dollars," farmers should contrast this operation with that of hauling and spreading

* There is reason to believe that no inconsiderable part of the carbon which enters the roots of plants from the soil comes from the atmosphere absorbed previously by the soil, partly from the air, and partly derived from the carbonic acid contained in rain-water as it falls upon the earth. The fact, however, should be distinctly stated, that decaying plants and mould yield carbon to all growing crops.

tons of manure on an acre, which are not worth a dollar a ton. Facts like these are full of significance. We have long contended, and religiously believe, that the cultivators of American soil perform more unnecessary work every year to obtain their crops than the aggregate labor of all other classes combined. This prodigious loss of national industry and capital can never be prevented until the laws of nature that govern the fruitfulness of the earth and the rewards of farm labor, *are studied, understood, and obeyed.* The unwillingness of the people, of State legislatures, and of Congress, to foster the study of good husbandry, is the greatest marvel of the age. *Why* the dung of sea-birds is worth forty dollars a ton, and that of horses only the *fortieth part of that sum*, is a problem in farm economy which every schoolboy fifteen years of age should be able to solve at once. According to the analysis of the recent dung of a sea-eagle, made by Coindet, it contains uric acid and ammonia equal to 45 per cent. of that valuable fertilizer; while a horse, eating rations composed of two-thirds timothy and one-third oats or corn, would void manure that had less than one per cent. of ammonia. In all the higher animals, most of the nitrogen in their food escapes by the kidneys, and not by the bowels. One hundred pounds of the dissolved salts contained in the urine of a horse or other domestic animal, dry, would be worth many times that amount of their dung.* It is not the *water* nor the *carbon* in the liquid excretions of a cow that makes them worth $10 a year in Belgium for the improvement of land.

The quantity of phosphates of potash, lime, and magnesia, of ammonia, chlorine, and other earthy constituents of crops, available to the farmer in his soil, is usually quite small. If this were not so, how could the application of only two hundred pounds of these salts in guano to a thousand tons of earth in an acre add fourfold to its productiveness? Estimating the soil as available to the roots of corn, wheat, clover, and other crops, to the depth of ten inches only, and it weighs two million pounds per acre. If we divide this sum by one hundred, (an amount of guano that often produces a great increase in a crop of corn,) it gives only one part in twenty thousand. The essential elements of crops constitute so small a part of the earth in which they grow, that it is not altogether improbable the time may come when they will be carefully extracted and stored up for safe-keeping in vessels hermetically sealed, or as involatile salts. A fertilizer that will produce three pounds of wheat or six of corn for one on poor land, is as worthy of a granary as the grain itself. Why not? When two hundred pounds of guano have produced nine hundred of wheat, can the wheat be so managed, after its consumption in bread, as to form two hundred pounds of manure equal in ammonia and phosphoric acid to the original guano? Probably not; but, taken as a whole, the night-soil may be quite as valuable as the guano. Researches in the preparation of night-soil, and its economical value, are greatly needed in this country. Our cities and villages increase so rapidly in population, and draw so constantly from the soil its most precious constituents of human food and clothing, that unless we adopt the principle of restoring as much potash, phosphorus, sulphur, chlorine, and ammonia, as we take

* It is because 100 pounds of oats extract a little more nitrogen and earthy salts from the soil than a like quantity of wheat, that renders the former the more exhausting crop, estimating the yield in tons.

from it in breadstuffs, vegetables, cotton, tobacco, and provisions, it must become at no distant day too sterile for profitable cultivation. It is not necessary to return to the soil as many pounds of matter as it yields in crops; but there are few so rich in potash, chlorine, sulphur, and phosphorus, as to render it safe farming to take more of these substances in plants of any kind than is restored to the earth. Soils often contain not over one part of phosphorus in an available condition in five or ten thousand; and to extract this mineral (without which not the first blade of grass, seed of grain, boll of cotton, leaf of tobacco, or crop of any kind, can be formed) and not make adequate restitution, is the extreme of folly. Pure phosphorus is worth from four to five thousand dollars a ton. This fact indicates the scarcity of the article even in the richest virgin earths; for, like potash, it all comes from the soil. Whoever will examine the analysis of the ash of cotton-seed, or leguminous plants, will see that phosphoric acid and potash are large and indispensable elements. Except in cotton-seed, the fertilizers in most seeds are habitually wasted, or sent abroad to market. This practice of throwing away in cities the most valuable food of plants, and then partially making up the loss by purchasing imported manure at $40 a ton, is discreditable to our national good sense and agricultural skill. If our crops need the elements of bones, ammonia, and potash, why waste these things by the thousand tons in cities and villages? If one-fourth of the weight sent to market in human food and raiment were returned to the country and the soil, (being the least abundant elements in the plants extracted from the land,) it would maintain forever, under a good system of farm economy, the highest fruitfulness of the earth. And who will say that the same vessels, railways, canals, and wagons, which convey four thousand pounds of breadstuffs and provisions to near or distant markets, cannot take back to the fields whence these products were drawn one thousand pounds of the raw material for making similar organic substances? The 75 per cent. to be left in cities is essentially the carbonic acid and vapor thrown out of human lungs in ceaseless respiration night and day, which carbon and vapor came from the nutrient atoms in the blood-vessels and from the food taken daily into the system.

All fermentation and decay in vegetable and animal substances in town and country discharge carbon and the elements of water into the atmosphere—mould being the *residuum* of such substances, and containing less than 25 per cent. of the original organized matter. It is on this account that a rich mould formed from clover is worth more, pound for pound, than the clover which rotted to produce it; for four hundred pounds of the dry plants will yield only one hundred of dry mould. In the same way, a ton of dry forest leaves is reduced to five hundred pounds of rich mould when properly rotted and dried. Hence, five hundred pounds of good mould will suffice to grow at least a ton of cultivated plants, if it be not wasted by a cultivator who refuses to study the soil which he ploughs and hoes.

One may separate one hundred and fifty pounds of carbon and the elements of water from a barrel of flour, and still leave, with its nitrogen and incombustible matter, four times more of carbon, oxygen, and hydrogen, in weight, than of the other ingredients in the flour. If guano contained 95 per cent. of its weight in charcoal and water, as wheat does, it would never be worth $4 a barrel as a fertilizer. In one hundred pounds of dry

corn there are ninety-seven of carbon and the elements of water; and it is generally easier to grow forty bushels of this grain on an acre than twenty of wheat. Experience shows that the same food of cereals which will produce twenty bushels of wheat will yield forty of maize. The prominent fact that guano and the best nightsoil operate equally to promote the growth of *all* cultivated plants, indicates that *all* require ammonia and phosphates; which is true. It also indicates that the things contained in nightsoil and in the dung of birds, or inthe excrements of flesh and fish-eating animals, are not abundant in ordinary soils; which is also true. As it takes not far from five pounds of corn to form one of beef, we should not be surprised to find that nature is as true to vegetable as to animal life, and so enables a pound of beef to produce five of corn. The quantity of different kinds of vegetable food consumed to form a given weight of flesh is an interesting study. Three and a half pounds of cooked corn-meal have yielded one of pork; or three hundred and fifty pounds have produced one hundred of the flesh and fat of swine. Thrifty sheep give quite as large a return; cattle a little less. This whole subject needs further investigation. The circumstance that some animal perchance eats the beef in advance of corn plants, affects not the purpose of nature in the least.

The reader may infer from the remarks offered on "the philosophy of improving land," that we regard good economy in feeding plants, and in saving the most valuable raw materials for making them, as the direct road to such improvement. We assume that the soil has been properly drained and limed, if it needs either, and that it does not lack vegetable mould. In addition to what has been said about the elements of crops, and their scarcity in ordinary soils, we desire to call attention to a few of the best plants for enriching land, which draw from the *subsoil and atmosphere* the most valuable atoms consumed in making human food and clothing. Some plants, like mosses, flourish on naked rocks; others can subsist on sterile sands; while by far the larger part of the vegetable kingdom would have no existence, unless the surface of the earth possessed nearly the degree of productiveness now exhibited. Destroy this productiveness by tillage or other means, and in time you make a barren, naked desert. But, instead of impoverishing the earth, a sound public policy demands that we should increase its natural fruitfulness, to meet the increasing wants of an ever-augmenting population. To achieve this result in the most economical manner, recourse must be had to the agency of growing vegetation. Among the plants best adapted to the improvement of land are the grasses, trifolias, legumes, turnips, and other root crops. In skilful hands, these can be so managed as to produce a great deal of cheap manure to enrich the surface of the earth, while the substance of the manure itself will be mainly drawn from the subsoil and the atmosphere. Peas have proved the best crop in the southern States for the renovation of partially exhausted fields; but we are inclined to believe that a legume called *sainfoin, sanctum fœnum*, or "holy hay," which has long been cultivated in the south of Europe, and is remarkable for the length of its roots and the depth to which they descend into the earth, will be found, on a fair trial, a more valuable plant. The roots of the pea plant do not descend so far as those of clover and lucerne, and, on that account, do not draw so much of the mineral food of crops from the

deep resources of the earth as is desirable. In an interesting chapter on "St. Foin," Jethro Tull remarks:

"The reason why St. Foin, *in poor ground*, will make forty times greater increase than the natural turf, is the prodigious length of its perpendicular tap root. I have been informed, by a person of undoubted credit, that he has broken off one of these roots in a pit, and measured the part broken off, and found it fourteen feet. This tap root has a multitude of very long horizontal roots at the upper part thereof, which fill all the upper stratum or staple of the ground; and of the thousands of St. Foin roots I have seen broken up, I never found one that was without horizontal roots near the surface, after one summer's growth."

In a note, the same author has these remarks:

"There is a vulgar opinion that St. Foin will not succeed on any land where there is not an understratum of stone or chalk to *stop the roots from running deep:* else, they say, the plants spend themselves in the roots only, and cannot thrive in those parts of them which are above ground. I am almost ashamed to give an answer to this."

"It is certain that every plant is nourished by its roots, as an animal is by its guts; and the more and larger roots it has, the more nourishment it receives, and prospers in proportion to it. St. Foin always succeeds where its roots run deep; and when it does not succeed, it never lives to have long roots," &c.

There is strong sense and plain Saxon in what this English farmer writes, who was about a century ahead of his time in agricultural improvement.

He says: "Any dry ground may be made to produce this noble plant, be it ever so poor; but the richest soil will yield the most of it, and the best. If you venture to plant with the drill, according to the method wherein I have always had the best success, let the land be well prepared before you plant it." Tull was careful not to cover the seed over a half inch in depth, and not to have it thick in the drill, particularly on poor land. In France, with decent culture, two or three good crops of this "holy hay" are made in a year. In favor of thin seeding and the resources of the subsoil, Tull has the following remarks:

"It is common to see a single St. Foin have a bigger tap root than twenty thick ones, [thickly planted,] and their length is in proportion to their bigness; therefore, that single plant may well be supposed to have twenty times more depth of earth to supply it than all those twenty small roots can reach to. And though these under-strata are not so rich as the upper, yet, never having been drained by any vegetable, *they do afford a considerable quantity of nourishment to those which first enter them.*"

The above was written a hundred and thirty years ago, and before subsoiling and the analysis of soils were known. Science and experience have alike demonstrated the fact that the "under-strata" of an impoverished soil are richer than the earth or stratum at the surface. The following practical suggestions are worthy of attention:

"Notwithstanding I commend the planting of St. Foin thin, that most of the roots may be single, yet I have fields that were drilled with but four gallons of seed to an acre, and yet, the rows being seven inches asunder, the roots are so thick in them that the ground is covered with the plants, which seem to be as thick (in appearance) as most sown St. Foin whereon seven or eight bushels are sown on an acre. I have other

fields that were drilled with about two gallons of seed to an acre, (which is five seeds to each square foot,) the rows sixteen inches asunder, *that produce better crops though the ground be poorer*. The drilled St. Foin, being regular, is more single, though as thick as the sown, and for that reason always makes a better crop, and lasts longer than the sown that is of the same thickness, but irregular." Again he says: "I have now a great many single St. Foin plants in my fields that are near *thirty years of age*, and yet seem as young and vigorous as ever; and yet it is common for thick St. Foin to wear out in nine or ten years, and in poor lands much sooner if not often manured with soot, peat ash, or coal ash."

Wood ashes and lime would doubtless be the best fertilizers in most districts of the United States. We invite particular attention to the age or long life of this legume, or "holy hay." It reminds us of the "tree of Heaven," (China tree,) whose multitudinous roots spread all over a small neighborhood, and whose leaves are devoured so greedily by cattle.

Tull learned to cultivate St. Foin in Languedoc, where he spent several years, and was able in England to cut his earliest crop in the beginning of May, before blossoming. He divides the crops into four sorts, viz: "1st, the virgin; 2d, the blossomed; 3d, the full grown; 4th, the thrashed hay." Although the following remarks are a little too ethereal, in the main they are true: "The first of these (virgin hay) is best of all beyond comparison; and, except lucerne, has not in the world its equal. This must be cut before the blossoms appear; for when it stands until full bloom, the most spiritous, volatile, and nourishing part of its juices is spent on the next generation; and this being done, all at once the sap is much depauperated, and the St. Foin can never recover that richness it had in its virgin state. And though in blossom it be literally in the flower of its age, it is really in the declension of it. If it be said that what is not in the stalk has gone into the flower, it is a mistake, because the greatest part of its quintessence perspires thence into the atmosphere." The aroma, or "quintessence" of "holy hay" in blossom, is doubtless something very nice, but subsequent experience in hay-making and vegetable physiology does not sustain the practice of cutting forage plants before they blossom, to improve the food or crop. Our author says: "The owner of this hay, if he be wise, will not sell it at any common price, but endeavor to have some of it every year if possible for his own use." A full crop of this hay cut when in blossom is 3 tons per acre. In stacking St. Foin, Tull recommends pulling up a basket in the centre of the stack, as the rick is made to form a "vent-hole" for air to circulate through and carry off dampness. *Sainfoin* seed is cheap and abundant in France; and we should be happy to see the cultivation of this perennial, deep-rooted legume fairly tested in the central and southern States, where we believe it would be valuable. Its seed is worth more per bushel than oats, and is hardly inferior to peas as food for domestic animals.

Lucerne, the *herba medica* of the Romans, has maintained a high reputation in the south of Europe for twenty-five centuries. It has been successfully cultivated in Chili, Peru, and Brazil, and from the last-named country introduced into this under the name of Brazilian clover.

If the Chilian clover seed ordered from Valparaiso should turn out to be a variety of the *medicago sativa*, or sainfoin, we shall not be disappointed. Mr. Loudon, in his Encyclopedia of Gardening, says: "Lucerne is highly extolled by Roman writers; it is also of great antiquity in Spain,

Italy, and the south of France; is much grown in Persia and Peru, and mown in both countries *all the year round.*"

We have traced the roots of this plant growing in the light, sandy soil of Georgia to the depth of 34 inches; and, like sainfoin, peas, and red clover, it draws largely on the atmosphere for its organic nourishment.

With a directness from the "well of English undefiled", which we cannot but admire, Tull speaks of its "tap-root that penetrates deeper into the *bowels* of the earth than any other vegetable she produces." He describes a plant on his farm 22 years old, and still in its youth. He says: "Its roots are abundantly longer than the roots of St. Foin; I have one that measures very near 2 inches in diameter; those which are higher than the ground have a bark like a tree. Upon this account, and by its stalks springing again just below the place where cut off, and by the woody hardness of its stalks when they stand too long without cutting, it seems that lucerne is of a nature nearly approaching to that of a shrub. It is the only hay in the world that can pretend to excel or equal St. Foin." This "medica" and classical hay, which was cultivated in beds by the Romans without iron-plough, hoe, or rake, is too well known to need any encomiums. It does best in a deep, permeable soil; and where the sub-soil is compact, it must be broken, either by trenching or the use of the sub-soil plough. Like St. Foin, it is best cultivated in drills, which should be far enough apart for a horse to walk between the rows to draw a hoe or cultivator.

If these plants shall prove as popular in this country as in Europe, it will be a very profitable business to raise their seeds for sale. After the farmers began to sow clover seed in the northern States for the purpose of renovating wheat lands, the production of this seed was for many years the most profitable branch of agriculture known in that region. At present, clover seed is too cheap for the business to be very remunerative. We do not believe that lucerne or St. Foin is likely to take the place of clover in any district where the latter does well; but they are worthy of trial on "clover-sick" fields.

The pines that grow spontaneously on the impoverished and abandoned fields in the southern Atlantic States, present a very instructive lesson to all that seek to understand nature's process for restoring fertility to the surface of the earth. Nature hauls no lime, nor marl, nor manure of any kind. She never ploughs, nor hoes, nor stirs the soil at all; yet she forms a black mould where man had robbed the ground of this necessary aid to the support of the higher orders of plants and animals. To study closely her operations in the process of enriching soils, is the highest wisdom of the practical husbandman. The seeds of pine trees have a structure that peculiarly fits them to be carried a great distance by birds and winds, and scattered far and wide over the whole surface of the earth. Under favorable circumstances these seeds germinate and grow into forests. We have studied only the sprouting and growth of the seed of the long-leaf pine on the poor sandy lands of Georgia. By the time its first two leaves have attained a length of 3 inches, its tap-root has descended 6 into the ground, and continues to penetrate into the earth, when unobstructed, any distance from 3 to 9 feet, and how much further we know not.

Pines are endowed with a large quantity of foliage, and their leaves annually fall, to decay and form new mould. In 1,000 parts of these leaves when thoroughly dried, we found 40 of incombustible earthy mat-

ter; while the same amount of pine wood gave only 2½ parts of ash. If the trunks of pine trees consumed as much of earthy minerals as their leaves do, these trees would always be very small, and could grow only on land rich in potash, and the other elements found in wood ashes. But while the exceedingly deep roots of this tree find the mineral constituents of vegetation far below the pasture of common plants, and the reach of the farmer's sub-soil plough, these minerals, instead of being deposited in the substance of lengthened roots, in the trunk and branches of the tree, are nearly all contained in its innumerable and peculiarly long leaves, and with them, in the economy of Infinite Wisdom, go to enrich the surface soil, that it may again become fruitful in bread-bearing plants. No soil naturally poor in potash can grow a dense forest of oak, hickory, walnut, maple, beech, and elm trees; for all these store up potash in their trunks, limbs, and roots, to a large degree. But 100 parts of their leaves, which annually fall to the earth, contain from 7 to 15 times more of incombustible matter than a like weight of their wood. The bark of these forest trees, and of all others so far as known, yields much more ashes than wood. In the tree called hemlock this fact is strikingly illustrated; for while its wood yields very little ash, its bark abounds in incombustible matter. This bark, like that on one variety of hickory, is cast off, and falls to the earth to rot and feed vegetation. Professor Emmons has investigated this subject of the distribution of the minerals in forest trees, in their heart and sap-wood, bark, &c., in a very satisfactory manner, and published the results in his "Agriculture of New York." Forest culture can be made more profitable in the United States than is generally supposed. There is very little land that will not grow the equivalent of a cord of good pine wood a year, and much that will produce a cord and a half in twelve months. In connexion with the improvement of soils, the cultivation of good timber can be prosecuted at a round profit. We are collecting facts on this too much neglected branch of rural economy, and hope to be able to furnish some useful information on the subject in our next report. A forest cannot be grown in a day, and before seeds planted in 1850 can yield much valuable timber, the United States will contain fifty millions of inhabitants.

The overflow of rivers and smaller streams, and artificial irrigation, should not be entirely unnoticed in this review of the principal means employed by nature and man to impart fertility to cultivated soils. River bottoms like those of the Nile, Euphrates, and Ganges, which are annually inundated, were doubtless first cultivated in wheat, rice, and other cereals. Under the most favorable conditions, such bottoms or flats required neither tillage nor manure of any kind to yield an annual crop of grain. Pliny remarks: "How easy is the husbandry of Egypt; for there the Nile, serving the turn of a good husbandman, begins to swell and overflow at the first new moon after the summer solstice. He begins fair and gently, and so increases gradually, as long as the sun is in the sign of Leo, and rises to his full height. On entering into the sign of Virgo his fury slackens, and then slowly decreases until he regains his wonted channel.

"It is always observed that if he rises not above twelve cubits high, the people are sure to have that year a scarcity; and they make their account for the same if he exceed sixteen cubits, for the higher he rises the longer he is before he is fallen to his level; by which the seed time is

past, and men cannot sow the ground in due season. It is generally understood that upon the subsidence of the deluge they cast seed upon the flooded land, *and turn in their swine to trample it into the soil when moist.*"

Cereals are grown by the above operation without the aid of plough, hoe, or harrow. The water stood long enough over the bottoms to kill all ordinary weeds and grass; and the seed-wheat trampled in by droves of hogs, had the advantage of all other plants. It is difficult to imagine a more primitive system of grain-culture. But droves of swine could not always be at hand to tread in seed at the time when their services were indispensable. Some land would become too dry before the grain was covered, and the feet of hogs or cattle would fail to bury it in the earth. In this dilemma, the ancient Egyptian "*sarcle*," as the Romans called it, was invented for digging up the ground. This implement, from drawings and inscriptions, appears to have been something between a modern hoe and a pick-axe. A slight change in its structure converted it into a rude plough, which was first drawn by men and women. The subduing of cattle to field labor, hauling the plough by their horns or by their tails, was altogether an afterthought. Pliny remarks: "In Lower Egypt the straw is never a cubit long; the reason being that the seed lies *very dry*, having no other nourishment than the mud of the river; and there is nothing underneath but sand and gravel. But in Upper Egypt, about Thebes, they are far better farmers, and have better harvests; that part being, as indeed most of Egypt is, *low* and *flat*." He goes on to say: "The same husbandry is practised in Babylonia and Seleucia, where the Euphrates and Tigris overflow their banks in like manner, but to better effect and greater profit, owing to their more general use of sluices and floodgates. In Syria, they have small, light ploughs on purpose for making these shallow furrows and stiches; whereas *with us in Italy*, in most places, eight oxen at least are required for one plough; and, indeed, to make speed with it, they must work till they blow and pant again."*

The breaking of American prairie at the west with eight oxen, panting and blowing, would even now look quite familiar to an old Roman, could he witness the operation. The early history of agriculture, and the kind of tillage that prevailed in Egypt when its husbandmen fed abundantly, through successive years of famine in surrounding nations, the population of such immense cities as Thebes, claimed a passing notice. It is a curious fact, that the comparatively independent wheat-growers of the inundated bottoms of the Nile, Euphrates, and Tigris cherished a sovereign contempt for the people who depended mostly on their herds and flocks for the means of subsistence. Joseph warned his brothers, that when they came before Pharoah they should say: "Thy servants' trade hath been in cattle, both we and also our fathers, that you may dwell in the land of Goshen, *for every shepherd was an abomination to the Egyptians.*" The rearing of "cattle" was more reputable than sheep-husbandry; but corn-culture was the glory of kings before the time of Abraham.

The science of agriculture and the true principles of tillage are no better understood now by the mass of mankind than they were five thousand years ago. Thirty years of unremitting labor to establish agricultural

*Pliny Hist., b. 18.

schools in the great State of New York have signally failed, from the lack of popular sympathy and countenance. Without the aid of chemical research, Jethro Tull, a century and a half ago, came as near to a correct knowledge of the use and value of mellowing frequently, and deeply stirring the soil, as one can. With all his genius, talents, and large experience, he fell inevitably into a false theory about "the pasture of plants," and "tillage being a perfect substitute for manure." No man in modern times has had a clearer or juster conception than Tull of the mechanical results which follow the deep and thorough "pulveration of the soil." Of the chemical effects of tillage, he knew next to nothing; and it was his lack of knowledge, as revealed by modern science, that led him into error.

"By tillage," says this distinguished writer, "we can enlarge our field of subterranean pasture without limitation, though the external surface of it be confined within narrow bounds. Tillage may extend the earth's internal superficies in proportion to the division of its parts; and as division is infinite, so may the superficies be. Every time the earth is broken by any sort of tillage or division, there must arise some new superficies of broken parts which were never open before; for when the parts of earth are united and incorporated together, it is morally impossible that they or any of them should be broken again *only in the same places.*"

The above reasoning on mere mechanical principles is unquestionably sound; but when an indispensable ingredient for making a plant is absent from the soil, and not supplied by art nor by the atmosphere, how can any degree of stirring or pulverizing the earth create the lacking element? Can any human art or use of implements form a new atom by tillage? When all the available potash within reach of the plough is consumed, what then? While it is apparent that something more than tillage may be necessary, the father of drill-husbandry to the contrary notwithstanding, it is proper to remark that but few farmers have brought their practice up to the full appreciation of the benefits of frequently stirring the earth, and mellowing it, to the depth of ten, fifteen, or twenty inches. The object of the agriculturist is to make the most of all the elements of crops which his soil contains. The raw materials of bread and meat at and near the earth's surface are the gift of Providence; and it is not less the duty than the interest of the husbandman to *husband* them with great care and wisdom. To break the undercrust, or subsoil, so that water, air, and warmth may freely descend and ascend about the roots of plants, and thus supply them at all times with their appropriate aliment, and enable them to grow in all directions, is the crowning glory of modern agriculture. In many places underdraining is also necessary. This is particularly the case where a field lies in a basin, having higher land near it, whose water-shed carries a part of that which falls in rains into the ground below and at a distance. In most of the States, if not in all, where a soil contains no more water than what falls upon it, underdraining is rarely necessary. But the unevenness of the surface, and the variable direction of many geological strata, operate to convey the water which falls on one acre or field into the earth of another acre or field. This of course gives an excess in certain localities, to be disposed of only by drains or open ditches. The growth of grasses and rushes peculiar to wet places will indicate where draining is required to sweeten the soil. Viewed as a mere mechanical operation, the farmer must see to it that his

tilled ground is neither too open nor too compact; that its depth and friability are maintained by the due admixture of sand, clay, and vegetable mould, aided by draining where necessary. Sandy, porous soils are improved by the use of a heavy roller and the treading of sheep, hogs, and young cattle, which should be fed on fields of this kind. There are usually more fine particles of earthy matter from eight to twelve inches below the surface than at it, which, being brought up by the plough, mingled with the surface sand, and rolled after seeding, will much improve the texture of the soil. Old fields are more apt to become compact, heavy, and lifeless, than too open and pervious to air and water. How to renovate and rejuvenate an exhausted clay soil will be better understood after we have studied the next chapter.

CHAPTER VI.

CHEMICAL EFFECTS OF TILLAGE.

We have seen in the preceding chapters that the minute subdivision of the soil operates to condense atmospheric air and other gases within its pores. It enables water to descend and ascend with greater freedom through the mass of tilled earth. We have now to consider the chemical effects which follow from the breaking and stirring of the ground. To render our explanations clear and satisfactory to plain unscientific farmers, it is proper to give the meaning of several words unavoidably used in discussing this subject.

That important hidden changes do take place in the soil, in consequence of good tillage, not to be explained by any mere mechanical theory, few intelligent men will deny. What are these occult changes in the earthy matter operated on by the implements of husbandry? At what point shall we begin to study them?

1. All matter is supposed to be endowed by its Creator with certain *forces* tending to form compound bodies, which forces exist sometimes in an *active*, and at others in a *quiescent*, state.

To illustrate: if the two gases called *chlorine* and *hydrogen* be mixed in the dark, no combination takes place; but if brought into the light, under the direct rays of the sun, the slumbering forces in these two bodies are excited into action, and a chemical union occurs with an explosion. An intense acid is formed, called hydrochloric or muriatic acid, which differs widely from both of its elements.

2. Different substances are endowed with *peculiar* forces, the intensity and other peculiarities of which can only be learned by observation and careful experiment.

Thus, the metals called iron, nickel, and cobalt, alone possess the force denominated magnetism—other metals have no magnetic power. A knowledge of the *forces* inherent in the elements of cultivated plants, is invaluable to the husbandman; for he deals constantly with these elements, and labors to change them—now into manure and available food of plants, and now into grain, grass, milk, and meat, as food for man and his domestic animals. The chemist finds five pounds of pure sulphur in 100 pounds of wool. This well-known mineral can only come from the food of the animal and from the soil. We now bring the wool-grower directly to this point: Does your soil contain, in an available condition,

sulphur enough to produce luxuriant crops of such plants as are best adapted by nature to keep sheep in good health? If not, then no amount of tillage, none of the chemical changes resulting from it, can give you good crops of clover, turnips, or cabbages. Why are 100 pounds of cabbage, exclusive of water, when perfectly sound, worth more as feed for sheep or cows, than a like weight of rye straw? That land too poor to yield a generous crop of cabbage will produce a fair one of rye or buckwheat, is known to most farmers. Although sulphur is not the only substance that exists far more abundantly in cabbage than in the other plants named, yet it is an element that seldom abounds in well-drained soils. Tillage can do much to promote fertility; but it cannot create something from nothing, nor change one elementary body into another. But tillage is usually more efficient to impoverish an arated field, than to improve it; and it is this deteriorating effect of cultivation, irrespective of all crops, to which we desire to call particular attention. The chemical changes in the soil, produced by ploughing, are quite independent of the presence of plants. Tillage dissolves more silica, potash, soda, lime, magnesia, chlorine, iron, mould, sulphuric and phosphoric acids, than would be dissolved without this operation. If this were not so, the farmer would have as little occasion to plough, harrow, and hoe, as nature has when forming her most abundant products of the earth. After tillage has dissolved the elements of crops, they do not remain long in well-drained land, if no plants are present to imbibe the water that holds them in solution. Wherever the water runs, most of the organic and inorganic constituents of vegetables go with it, after they are fairly dissolved, like common salt in water. There are, however, several modifying chemical and physical properties in good soils, by which, when irrigated with water holding saline minerals in solution, a part of these fertilizers is retained. Thus, if the sulphate or muriate of ammonia in a weak solution be passed through a clay soil, the salt is decomposed, the ammonia is retained by the alumina, and the chlorine or muriatic acid, or sulphuric, as the case may be, will pass through as the chloride or sulphate of lime. Professor Way has published some interesting experiments on this subject, in a late number of the Journal of the Royal Agricultural Society of England. The effects of irrigation, both natural and artificial, and of tillage, on the chemical constitution of the soil, demand further research. A good deal more water will evaporate from an acre of land, than falls upon it in the course of a year. Hence a good supply of moisture in the subsoil, to rise by capillary attraction about the roots of needy crops in dry weather, to keep good the fluids circulating in plants when evaporation at their leaves is most active and profuse, is a matter of the highest importance. As a general rule, less water will ascend from the subsoil to the surface than descends into the earth—a part going to feed wells and springs or underground rivulets. What portion of the water that annually falls in rain and snow runs off into creeks, rivers, and swamps, on the surface; what portion sinks directly into the ground; and of this, what part rises again and is evaporated from the leaves of plants or from the naked earth, we are not informed; nor are there data sufficient at present to warrant an extended generalization on the subject. The common practice in England of placing numerous drains in the earth, at from 30 to 50 inches below the surface, and measuring the fall of water on a given area, and the quantity that percolates through soils of different texture into these cov-

ered conduits, has furnished nearly all the information we possess on the points under consideration. From one tenth to a sixth of all the water that falls on a level or nearly level surface in the course of a year, will find its way into well-constructed drains in the climate of England; but a very humid atmosphere, with a low mean temperature, is ill adapted to the rapid evaporation of water from the foliage of plants and the surface of the ground. According to observations made by Charles Charnock, esq., through a series of five years, and published in the Journal of the Royal Agricultural Society of England for 1849, a soil which evaporated 33.61 inches of water in 12 months, had this quantity reduced to 22.48 inches when kept in the shade. This fact shows that shade and sunshine, as well as humidity and dryness, heat and cold, exert a powerful influence on the ascent and descent of water through the soil. In England it is found, by experiment, that a quarter more water will evaporate from the surface of an acre than falls upon it, if artificially irrigated. Anxious that investigations of this kind should be prosecuted in this country, we will give a few of the results of researches and observations made by Mr. Charnock:

In 1842 the fall of rain was 26.11 inches; the evaporation in the sun, 30.02. In 1843 the fall of rain was 24.49; the evaporation, 31.19. In 1844 the evaporation was 37.85; while the fall of rain was only 19 inches. The evaporation was from a soil kept saturated by the frequent application of water in measured quantities. The quantity that fell was determined by a rain gauge in the usual way. In 1845 the fall of rain was 28.18; the evaporation, 31.09. In 1846 the fall was 24.24 inches; the evaporation, 33.28. The mean evaporation in the five years named was 32.686 inches; the fall, 24.402. The quantity of water that will percolate through a soil or common earth to the depth of three feet, depends so much on the physical properties and condition of the mass in each instance, that a large number of experiments on various soils can alone settle the question. The quantity of water that filtered through three feet of earth was, in 1842, 4.55 inches; in 1843, 4.28; in 1844, 3.60; in 1845, 4.92; in 1846, 6.76. These results were obtained by means of a leaden vessel three feet deep and one foot square, into which was put two feet of gravel and calcareous sand, so as to represent the substratum of the farm, and the remainder was filled up to an inch of the top with an average quality of soil. At the bottom a pipe was inserted, which conveyed all the water that filtered through into a bottle, which was regularly emptied and registered. The leaden vessel was inserted into the ground to within an inch of the surface, keeping the level of the soil inside and outside alike, with an inch of the vessel above, to prevent any communication of water from without. The soil was kept free from weeds, and occasionally stirred, that it might not be more than ordinarily compact.

To determine the evaporation from saturated soil, a leaden vessel thirteen inches deep and a foot square was filled within an inch of the top with soil, and placed in the ground in the same manner as the previous vessel, with a pipe level with the surface of the soil to carry off the excess of top-water into a receiver. This soil was also stirred occasionally, to correspond with tilled land which is wet and undrained. It will be seen that more water than falls upon a field must come into it, either by springs from below or by running over the surface, by filtering through the earth from the dip of its strata or the unevenness of the ground, to

supply as much as will evaporate. If heavy showers did not fall suddenly, it would be rare for the surface-soil to contain any considerable excess of moisture on common land. We have already stated that the earth on an acre weighs 2,000 tons by going to the depth of twenty inches. This will hold from four to six inches of water without inconvenience if equally distributed. An acre of water an inch deep is not far from 25,000 gallons, so that where forty inches fall in a year a million gallons are received on each acre. How to make the most of this water, whatever the precise quantity, and prevent all damage from washing and undue leaching, is a study that commends itself to the attention of every farmer.

We have known wheat sown the first of December to be harvested by the 20th of May, in Georgia; while in Maine, wheat sown the first of September is rarely ready for the cradle before the first of August. Why should five months and twenty days suffice to grow a crop of wheat—and they include all the cold of winter—in the State of Georgia, while eleven months are necessary in the State of Maine? We draw the following inferences from the facts named:

1. That as great *chemical changes* take place in the soil of the southern State in six months as occur in the soil of the northern State in eleven months. These changes consist essentially in decomposing both organic and inorganic substances which were before insoluble in rain-water, so far as is necessary to render them soluble, and in a condition to enter the roots of plants.

2. That air, heat, rain-water, and probably electricity, are the prime agents in effecting the necessary chemical changes in the surface of the earth, which supply, day by day, aliment to all vegetation.

3. As much water enters the roots and passes out of the leaves of wheat plants in six months in Georgia as in eleven months in Maine. From the increased activity of all chemical, physical, and vegetable phenomena at the south, the intelligent reader will see why a defective system of tillage and husbandry there should impoverish the land faster than at the north. But the same agencies which rapidly exhaust the elements of crops when misdirected, will recuperate with equal facility and regain the lost fertility in the warmer climate. To ascertain the changes that transpire in cultivated and uncultivated soils in the course of three, six, nine, and twelve months in different latitudes, and under various circumstances, is not so formidable an undertaking as some may suppose. By leaching a cubic foot of rich earth six months with rain-water as it falls from the clouds, one may grow wheat, corn, or other plants in pounded glass with the fertilizers so extracted; and by applying a known quantity to the crop, and weighing it when matured and thoroughly dried, we can determine the relative weight of the plants organized, and of the food given to them. Thus, if a corn-plant weighs when dry eight drachms, and has received only one drachm of dissolved organic and inorganic matter extracted from a rich soil, it is plain that ground glass, heated to burn out all vegetable substances, and washed in hydrochloric acid, still further to purify it, could not yield the other seven drachms of weight in the corn. It must have drawn 87½ per cent. of its solids, which are carbon and the elements of water, from the atmosphere and water. There are other ways in which the writer has been able to demonstrate the important fact that, in forming one hundred pounds of organized matter in cultivated plants, the soil

parts with less than fifteen pounds, and often less than ten, of its solids. Sand that has been burnt at a red heat for some time, and boiled in a strong mineral acid, will grow crops by feeding the plants on such of their constituents as good soils or the best manure furnish. In truth, the substance of the earth which does not dissolve when a crop is growing has no more to do in adding to its weight than ground glass has, or than cotton has, when plants are grown by extending their roots into its moist fibres. It is a knowledge of this fact which has led to the extensive culture of mere drifting or desert sands, with the aid of ashes and guano. The more we learn of the raw material of crops, as it exists in the soil, the less important is it that the surface of the earth abound in such raw material as is supplied by nature.* Science corrects these defects with constantly increasing facility. Bone earth, or phosphate of lime, is a mineral less abundant in most soils than is desirable; but chemistry has demonstrated that all cities abound in posphates of lime, potash, and magnesia, and in ammonia, which are derived from the breadstuffs and provisions consumed by their inhabitants, and the oats, hay, and other food of horses and cows kept within their limits. That fertilizers of this kind are generally allowed to run to waste not only in cities, but in villages, and even on many farms, is a fact known to every agriculturist. There are, however, extensive natural beds of *apatite* (phosphate of lime) being discovered by the researches of geologists and chemists, which promise greater usefulness to agriculture than any deposites of gypsum known. Professor Emmons, of Albany, has recently presented specimens of this mineral from an extensive bed near Crown Point, New York, to the State Society, which is noticed in the December number, 1850, of the journal of said society. Dr. Buckland, dean of Westminster, has an instructive paper on the "Causes of the presence of phosphates in the strata of the earth," in the tenth volume of the Journal of the Royal Agricultural Society, from which we will copy a few sentences:

"Professor Liebig five or six years ago invited the attention of agriculturists to the possibility of applying to the same use as bone dust and guano the fossil bones and coprolites† which occur together in certain beds of the lias formation. This invitation took place not many months after I had the honor of conducting him to the well-known *bone bed* in the lower region of the lias at the Aust Passage Cliffs, on the left bank of the Severn, near Bristol, where two beds of lias (each from one to two feet thick) are densely loaded with dislocated bones and teeth and scales of extinct reptiles and fishes, interspersed abundantly with coprolites, derived from animals of many kinds, which seem to have converted that region into the *cloaca maxima* of ancient Gloucestershire at the time of the commencement of the formation of the lias. * * * In 1846 Professor Henslow laid a paper before the British Association, at Cambridge, on the abundant occurrence of the ear-bones of whales in the crag-beds of Felixstow, on the coast of Suffolk, together with large quantities of rolled pebbles of phosphate of lime, (which he then supposed to be

*The idea advanced in the text is, that science and art are able to remedy natural defects in soils with ever-increasing economy as the positive wants of cultivated plants are more closely studied and better understood. In this way knowledge is better than money or rich lands, for it is a perennial source of wealth, enjoyment, and independence.

†"Coprolites" are fossil or petrified dung of sea-animals, amphibials, and birds, found in fossiliferous rocks.

coprolites,) among the miscellaneous gravel and shells that compose the bulk of the crag formation. About this time, also, Professor Solly's analysis of these supposed coprolites proved their chemical composition to be nearly identical with that of real coprolites from the lias; and the attention of agriculturists was invited to their use as a manure of nearly equal value with guano or bone-dust. Mr. Solly's advice to agriculturists to make use of this newly discovered storehouse of fertility has been duly responded to, and *many thousand tons* of these pebbles and bones have been collected from the shore near Felixstow, ground, and used as a manure."

When it is known that these fossil bones of whales are many feet above the ocean, and that not an inhabitant of the tertiary sea in which they flourished is now found, we are constrained to acknowledge that science has taught farmers how to form bread and meat from the remains of animals that lived and died before the island of Great Britain had an existence. From the Hudson to the Rio Grande, the Atlantic and Gulf States contain many tertiary strata having fertilizers of great value. French burr, greensand, chalk, and other valuable deposites, exist in Georgia.

Doctor Buckland thus graphically indicates the way in which fertile earths were formed, long before there was "a man to till the ground:"

"I believe the essential condition was the admixture (in a fluid or semi-fluid state) of all the now consolidated ingredients of the marlstone and of the septaria, (which we use to make our Roman cement,) viz: of clay, *carbonate of lime*, and *protoxide of iron*, in a state of mud on the sea-bottom at the time of the disengagement of phosphoric compounds from the dung and putrefying bodies of fishes and of molluscous animals and marine worms at the bottom of the seas in which the deposition of the London clay was going on. These conditions that attended the deposition of the London clay were similar to those attending the deposites of sedimentary mud (subsequently converted to beds of clay and marl) in all geological formations since the waters were first peopled with swimming creatures of ten thousand kinds, with creeping things innumerable, both small and great beasts.

"From the first creation of fishes, to fill and multiply in the waters, there must have been a never-ceasing deposition of phosphoric compounds in every bed of mud that was in progress of accumulation at the bottom of all inhabited portions of seas, and lakes, and rivers; and thus the fecal dejections of all subaqueous animated nature must, by their decomposition, have supplied daily and hourly accessions of matter convertible to *phosphorite*. There must have been also a further never-ceasing supply of phosphates from the decay of the bodies of all these animals after their death—*i. e.*, from the dead bodies of all fishes, and molluces, and sea-worms that were not devoured by other animals."

The above reasoning will account as well for all the other elements of living beings necessary to fertility in sedimentary rocks having sand, clay, lime, and iron for their mass, as for phosphorus. This learned geologist and divine, who has done so much to popularize the great truths of science, remarks that, "where the bottom of the sea was covered only with silicious sand, no phosphoric combinations could take place; and hence the barrenness of the great silicious sandy deserts of the world; but where the bottom of the water contained in an unconsolidated state the ingredients of future marl, or marlstones, or septaria, conditions were

present favorable to the formation of the new combinations of phosphorite."

Before tillage is applied to the soil, a large share of its phosphoric acid is combined with alumina and iron, and a large portion of its potash, soda, lime, and magnesia with silicic acid. In these forms silicic acid, the alkalies, and phosphoric acid are insoluble, and unavailable as food for cultivated plants. Tillage brings oxygen gas, condensed in the pores or innumerable spaces in well-cultivated land, into a condition to act on the sulphur in iron pyrites, and form sulphuric acid. This acid, as well as carbonic acid evolved by the rotting of vegetables turned under by the plough, attack the insoluble silicates of potash, soda, lime, and magnesia, and liberate their alkaline bases. So long as potash and soda exist to combine with nitric acid in a soil which abounds in decaying vegetation, or where stable manure is applied to it, such acid is formed by the chemical union of oxygen and nitrogen, and it immediately combines with potash to form saltpetre, or, with soda, to form nitrate of soda. Hence, so long as the mineral food of crops exists, *even in an insoluble form*, tillage and organic manures will operate to extract it, although latent in sand as hard as pulverized glass. Artificial nitre-beds consist essentially of a mixture of wood-ashes and manure.

The ashes furnish the necessary alkali, and the manure, in decomposing, starts the formation of nitric acid, which is continued at the expense of nitrogen in the air for an indefinite time, if potash be present to take up the acid as it is formed. This acid, as has already been stated, consists of fourteen parts of nitrogen chemically united with forty of oxygen. Phosphoric, sulphuric, nitric, hydrochloric, silicic, and carbonic acids, as well as the bases—alumina, iron, lime, potash, soda, magnesia, and ammonia—are all brought into active play through the agency of the plough, harrow, cultivator, and hoe. If we compare the aggregate weight of the earthy constituents of crops removed from the soil by tillage, pasturage, and mowing, with the weight of such ingredients restored to it, we shall find that the surface of our farms is constantly losing its alkalies, phosphorus, sulphur, chlorine, and soluble silica. If we obtain larger crops than formerly by deeper and better cultivation, what is gained in crops is lost in their elements consumed in making them. The bone-earth, potash, and magnesia in the sub-soil are as certain to be all extracted in time, as the loss of similar elements taken from the surface soil in previous crops. The quantity can only be augmented by adding to the land such minerals as have been removed in water passing over or through the soil, in the stomachs of domestic animals, and in the several crops taken from the field. We dwell on this point because, of the hundreds of communications sent to the Patent Office estimating the cost of growing grain, cotton, roots, tobacco, hay, and other crops, no one has taken into the account the value of the raw material in the soil which is consumed to form the products of human industry.* It would be quite as sensible

* There are some soils so well stored with the earthy elements of crops that we do not wonder that their value in a commercial point of view should be entirely overlooked. In a valuable communication, sent too late for insertion in this report, Mr. Joseph Sibley, of West Rush, Monroe county, N. Y., (in the Genesee Valley,) says: "I know lands that have been constantly worked for more than thirty years, which were thought at first to be poor, without receiving any manure, that now produce more than double the growth of any kind of crop that they would during the first five or ten years of their cultivation." He adds a fact or two which deserve particular attention: "Our soils are highly impregnated with lime, and the most of them

to overlook the value of the coal, the ore, and the lime consumed in making iron, as to neglect the potash, ammonia, lime, magnesia, chlorine, phosphorus, sulphur, and mould, consumed in making a crop of wheat, corn, tobacco, cotton, potatoes, or hay. The best manure is only valuable because it consists of these substances. Strike out of a fertilizer everything but water and carbonic acid, and it will be worthless to enrich a sterile soil. The salts in the ocean, of which Peruvian guano is the best representation, should be obtained, and employed to add three-fold to the productiveness of cultivated land. The same organized and disorganized elements in the sea that support its Flora and Fauna, are equally capable of nourishing all land-plants and animals. Every river and smaller stream that falls into the ocean, carries with it an indefinite amount of both the mineral and organic constituents of all crops. All lakes and seas which have no outlet, except by solar evaporation, are salt; and in many places salts of lime, soda, and potash are precipitated. It is more than probable that the evaporation of sea-water in Florida and other southern Atlantic and Gulf States, to obtain salts for manure, will pay a fair profit. The water should be let into shallow basins at high tide, and there retained till the sun and wind evaporate it. The more compound the salts, the better for all agricultural purposes.

A letter from the Chincha guano islands, on the coast of Peru, dated November 20, says that there were then a large fleet of vessels there, loading principally for England; but some few were up for the United States. "The guano is mostly taken from the north island, the southern one remaining untouched; and there are said to be on the three islands thirty millions of tons of guano. It is thirty feet in depth.

"At different points on the island are shoots or tunnels, made of heavy canvas, about three feet in diameter and 50 or 60 feet in length, reaching from the top of the island to the water, under which the boats are placed to receive the guano; and as it runs down with considerable velocity, they are soon despatched." As the consumption of this article is rapidly extending in the United States, we will give the results of a few experiments in England, where it was applied on much richer land than any manured with guano in this country, and reported to this office. At a late meeting of the Sittingbourne Farmers' Club, Sir J. M. Tylden gave the following results of experiments with guano: "Last autumn I set apart three pieces, of a quarter of an acre each, of Spalding wheat. On No. 1 I put no manure; on No. 2 applied guano at the rate of four cwt. (448 lbs.) per acre; and on No. 3, guano at the rate of two cwt. (224 lbs.) per acre. The cost of guano on No. 2, £2; of No. 3, £1 per acre. The yield of No. 1, not manured, 28 bushels per acre; weight of straw, 1,664 lbs. per acre; weight of wheat, 61½ lbs. per bushel. No. 2 had four cwt. of guano sown and harrowed in with the seed: yield, 38 bushels 6½ gallons per acre; weight of straw, 3,936 lbs. No. 3 had two cwt. of guano sown and harrowed in, as with No. 2: yield, 35 bushels 6 gallons; weight of wheat, 61 lbs. per bushel; weight of straw, 3,312 lbs."

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with the sulphate of lime, which accounts for their not becoming, like most other lands, so speedily exhausted without manure. With good husbandry, I have no doubt that most of our lands in this county will be as productive one hundred years hence as they now are. Much of the land which, when first improved, would not produce grass to any extent, now, after being worked for many years without manure, yields as fine hay and pasture as almost any in the country. Plaster is extensively used, as it abounds in the county, but its effects are less beneficial than formerly."

From the above data it will be seen that on land so fertile as to produce 28 bushels of wheat per acre, 224 lbs. Peruvian guano gave an increase of seven bushels six gallons of grain, and of 1,648 lbs. of straw. The additional two cwt. added only three bushels to the crop, when brought up to 35 bushels 6 gallons; which shows, that as the manure last applied cost a pound sterling, the gain did not pay. The straw and grain being more valuable in England than in this country, as well as clover and turnips, which follow wheat, of course higher manuring there than here is allowable. It is worthy of remark, also, that, taking everything into the account, while 224 lbs. of guano paid a profit of 85 per cent. on its cost, 448 lbs. gave a profit of only 25 per cent.

The proper quantity of manure per acre which one ought to apply to obtain the best results, is a matter of great importance. In deciding this point one must carefully estimate the value of the crop when grown, the condition of the soil, and the usual effects of any given amount of manure of a particular kind or quality. From the closest calculation of profit and loss which we can make, aided by the experience of hundreds of practical farmers, who have kindly answered all our questions, we reach the conclusion that lands should be made to yield about 30 bushels of wheat per acre in this country to produce the grain at the least expense per bushel in a series of years. We have before us the London Agricultural Gazette, of January 4, 1851, in which it is stated that a field that gave 32½ bushels of wheat per acre without manure, yielded no more when guano, phosphate of ammonia, and potash were applied to parts of it; and we doubt if the largest crops of grain, whether wheat, corn, oats, or barley, pay for the last ten bushels per acre added to the same. The wheat-growers of Denmark, it is stated by the correspondent of the London Morning Chronicle, have brought up their lands to an average yield of 38 bushels per acre. If this be true, manure must cost next to nothing there, to go any further in the improvement of the soil. In the improvement of wheat itself, corn, and cotton, we think much may be done by the aid of science; but that is a subject which we shall not now discuss.

The burning of stubble has some advantages and many advocates. A writer says: "By burning the whole surface of one half of a field, it bore last year an excellent crop of turnips, without the aid of farm-yard dung; and this year it has produced 10 bushels of barley and 13 trusses of straw more than any other part which received 18 loads of farm-yard manure."

Where vegetation is rank and the ground sour, burning tends to destroy all organic acids, sweeten and improve the soil. After lands are properly drained, caustic lime not only neutralizes all acids, but it attacks and ultimately consumes all organic substances. It operates most favorably when often applied and in moderate doses. The farmer should proceed with caution, experimenting in a small way at first, watch results, and increase such practices as promise the highest pecuniary reward. Both the art and science of feeding cultivated plants are in their infancy; and we must devote years to the accumulation of new facts before we shall be warranted in saying how productive a soil should be made by artificial means to yield the largest income to its owner and cultivator. To develop new truths in rural economy, every State in the Union should maintain a well-conducted experimental farm, the records of which would add largely to our knowledge of the capabilities of improved land to feed and clothe the human family. As tillage consumes both the organic and

mineral constituents of crops, it should be applied to no larger area than is demanded for the highest gain of the husbandman. There are millions of acres annually devoted to the production of grain, cotton, and tobacco, more than are strictly necessary to obtain the quantities of these staples harvested. This involves the wasting and entire loss of an immense amount of vegetable mould, lime, magnesia, phosphorus, sulphur, potash, soda, chlorine, and ammonia. Although the departure of these things from arated land is not seen, and they do not appear in the crops, their loss is none the less certain. Some of them have passed into the atmosphere, and some have gone to the ocean. When a prairie is broken at the west, it often operates to make the neighborhood sickly for a season or two. Why is this? Because tillage greatly augments the decomposition of the vegetable and animal substances in the virgin soil. The air is loaded with fertilizing but poisonous gases that ploughing, harvesting, and hoeing discharge into it. Tillage is a most unnatural operation, and its effects on sand, clay, iron, lime, and other minerals, as they exist in the surface of the earth, can be understood only by one who is familiar with all the great truths revealed by the critical study of agricultural chemistry. So much preliminary knowledge of acids and bases and the play of affinities is needed, that one encounters almost insuperable difficulties in attempting to explain how carbonic acid derived from mould attacks the insoluble silicates of potash, soda, lime, and magnesia, and in the end yields to needy, growing plants soluble flint, soluble lime, magnesia, and all other elements present in the soil. One who has read with care Johnston's Lectures on Agricultural Chemistry and Geology will have no difficulty in comprehending the chemical effects of tillage in consuming the food of plants, without such food ever entering their roots. Economy in saving the raw material of crops is only attainable by knowing all the results of tillage in decomposing mould and all compounds of silica, alumina, iron, lime, potash, and other bases. So soon as one crop is off the ground, another should succeed; not, indeed, further to exhaust the soil, but to collect in growing plants all the available elements of human food and clothing within their reach, to be carefully husbanded for future use. If the renovating crops be turned in by the plough, the soil gains carbon and nitrogen from the atmosphere; if consumed by domestic animals, the farmer has their manure, which costs him next to nothing. One that knows how to use growing plants to the best advantage can improve his land at the least expense. Indian corn possesses many elements of productiveness, and in skilful hands will add rapidly to the organic and inorganic food of other crops, where all such food is preserved from waste. Turnips are extensively used for a similar purpose in Great Britain, and may be equally so in this country.

FRUIT CULTURE.

BY J. J. THOMAS, MACEDON, N. Y.

After a lapse of two centuries since the settlement of the country, the cultivation of fruit is just beginning to assume a character its merits deserve. More trees have been set out into orchards within the past five or six years, even in those regions which were long since settled, than in all previous time. This rising estimate of the value of fruit is not founded on any false basis, and is not destined, like many other objects of general and eager interest, to endure only for a season and then pass away. So long as substantial and cheaply furnished food and the most desirable and wholesome luxuries shall be objects worthy of attainment, so long will fruit culture maintain its importance.

I. *As an article of food*, fruit, and more especially *apples*, have been proved of great value. Some farmers save annually, in various ways, from fifty to a hundred dollars by the use of green and dried fruit upon their tables—not merely by the amount of aliment afforded, but, adding to the variety and to the list of luxuries, enabling them to reduce the amount of other and more costly articles. By planting rich and high-flavored sorts for culinary purposes, instead of those of an inferior grade, a great saving may be made in sweetening and spices. The amount of sugar and other ingredients used for making bad apples good is often more than enough to buy good apples, sugar and all. Fall pippins, for example, at fifty cents per bushel, have been found more economical than poor and insipid varieties at fifteen cents per bushel. By a free use of the best sweet apples through autumn and winter, for baking and for puddings, some families have avoided large expenditures. The aggregate saving in the million of American families who might enjoy the privilege of plenty of fruit, with a general cultivation of the best kinds for a succession the year through, might perhaps be set down, without extravagance, as more than the whole expenses of the general government.

Not less important is the value of fruit as an article of food for domestic animals. Although direct and careful experiments by weighing and measuring are still wanting, enough has been ascertained to prove that apples, especially the richer sweet varieties, as food for cattle and swine, are fully equal to potatoes; and some of the most careful trials already made indicate their decided superiority, being about as seven to five. The chemical analyses of these two productions show the superiority of the apple in the aliment it contains, and also prove that some sorts excel others in richness and value. Hence the importance of ascertaining by careful trial those sorts best adapted to feeding and fattening.

For fattening swine, apples are particularly excellent. Some farmers have saved three-fourths of the expense of pork-making by allowing their hogs the run of a part of their orchards while the autumn fruit was falling from the trees. A neighbor sold forty dollars' worth of pork, fattened with the "droppings" of only half an acre of good grafted orchard. The process was completed by a week or two of feeding with grain. Even common seedling apples, if cooked, are valuable. In one experiment, 500 pounds of pork were made from 120 bushels. There is no doubt, how-

ever, that selected grafted varieties would have been found much superior. Even the hogs themselves are good judges, and show much discrimination in choosing the best trees whenever a plentiful supply is allowed them.

For milch cows, sweet apples regularly and moderately fed, after being sliced to prevent choking, have been found to increase the milk one-third in quantity. They are also good for horses, as well as for nearly all other domestic animals.

While, therefore, the apple possesses a high value from its inherent qualities for feeding, the cheapness of its production far exceeds that of nearly every other article for this purpose. Taking as an average the value of land at fifty dollars an acre, we have the following estimate giving the actual cost of one acre of orchard:

Cost of land - - - - -	$50 00
Cost of 50 apple trees - - -	10 00
Cost of setting out - - - -	5 00
	65 00

The crops from the land will more than pay the yearly interest for the first few years, and the product of both land and trees will more than pay it as they become larger. An acre of full sized bearing trees would therefore cost no more than sixty-five dollars. With the selection of the most productive sorts, in connexion with the vigor imparted by good cultivation, the trees will yield on an average at least eight bushels each, or four hundred bushels from the acre. The annual interest on the orchard at 6 per cent. would be about four dollars; the necessary cultivation and manuring, to maintain a most fruitful condition, would not exceed six more, making *ten dollars* the whole yearly cost of the *four hundred bushels*, or *two and a half cents per bushel.* In the more fertile parts of the country, the only cultivation required would be one ploughing and two or three harrowings annually, reducing the cost of the ungathered crop to about one cent and a half per bushel—a sum much lower than the same value of nutriment yielded by grain or root crops. The only drawback is the time required for growth; and as immediate results are too often the controlling motive for exertion, the more remote and superior advantages of orchards as a source of food are but scantily enjoyed. No landowner need fear to plant extensively for the purpose of a copious supply—needing not, like other crops, the yearly attention of procuring seed and planting. Such crops can never suffer by a glutted market, so long as the growth, maintenance, and fattening of domestic animals form an important portion of agricultural economy. Nor is the time required for an orchard to come into full bearing so great as common opinion regards it; for through the vigor imparted by good culture, trees will attain a full bearing age in a third of the time requisite where the soil is neglected, and the trees allowed to take their own course.

II. *As an article of comfort and luxury*, the value of fruit can scarcely be estimated. The few who have learned by actual experience the enjoyment of the best and most delicious sorts for the whole twelve months would not willingly relinquish the privilege. Many, it is true, have furnished themselves with occasional supplies of their own raising—they

possess only a few scattered fragments of the yearly circle of fruits; but the number is yet much too small, although rapidly increasing, who may place upon their tables delicious sorts on almost any day of the entire year.

Facilities for this annual round of delicacies vary in different portions of the Union. In the more northern States, where the culture of fruit has received the most attention, the earliest sorts of the cherry and strawberry ripen by the first days of summer; the later sorts, with the addition of currants and raspberries, extend the period for six weeks, or until midsummer. Apricots, in connexion with the earlier pears, plums, and apples, immediately follow, and fill up the space till the rich profusion of autumn fruits, in all their kinds, keep up an abundant supply till winter. Grapes and pears may be kept till spring; and, by a proper attention to sorts and to good keeping, apples may be had every day of the year, or at least until the next strawberry season in early summer.

Is not an abundant provision for this yearly supply an object worthy of much exertion? What commodity is more calculated to increase the comforts of country life, and to add to the pleasures and to increase the attractions of home to young people, than fine, ripe, and refreshing fruit, of one's own raising, during a whole season? The enjoyment yielded by a single bed of strawberries, supplying a few quarts daily for the table, we have never yet known to be despised; but this is but as a single specimen in a rich and profuse cluster, when compared with the whole assemblage, embracing delicious and ruddy cherries, golden perfumed apricots, juicy and refreshing apples, luscious bloom-dusted plums, buttery and melting pears, fragrant and crimson nectarines, clustering and transparent grapes—all diversified with their many and varying sorts.

III. *The value of fruit for market*, as a source of income, has been proved by many striking instances. Farmers, whose orchards do not occupy a tenth of their land, often make more by the sale of fruit than from all other crops besides. We have already seen in what manner 400 bushels of apples may be relied on as an annual crop from one acre of land. Admitting only half this amount of good fruit for market, and that the ungathered crop is worth only twelve and a half cents per bushel, (the lowest we have ever known for good winter apples,) then we have twenty-five dollars as the yearly interest on an investment of sixty-five dollars; or, deducting three dollars for cultivation, twenty-two as a net dividend. There has scarcely been a season, however, for a long series of years, when good apples have not been worth at least twenty-five cents, which, for the small crop just set down, would make the yearly net product forty-seven dollars per acre, or more than two-thirds the capital invested. With other fruits, the price is often much higher. Good late pears, after transportation to great distances, sell in our cities at three to five dollars per bushel. Single trees, producing eight to twelve bushels each, have in a number of instances afforded a profit of twenty or thirty dollars. Farms of a hundred acres are scarcely ever made to yield so much as a well-managed single acre of such pear trees would produce.

A few well attested instances of success will show that these estimates are not extravagant. Richard J. Hand, of Monroe county, New York, sold in 1845 $440 worth of northern spy and Roxbury russet apples from one acre. The land was well cultivated. Numerous cases have occurred under the notice of the writer where one hundred dollars or more have

been made from the sale of an acre of good winter apples; and a number of trees of the Rhode Island greening have borne forty bushels each at a crop, yielding ten dollars from each tree. A fruit raiser in Orange county, N. Y., sold in one year more than three hundred dollars' worth of plums from the fourth of an acre. These are only a few out of many instances which might be given.

Now, it is admitted that these are unusual cases; but they are so for no other reason than that good cultivation is unusual. No part, in the management of trees, receives more general neglect; and no neglect results in greater loss to the orchardist. It seems particularly unaccountable that while fruit trees furnish larger returns than anything else on the farm, they should be the very thing that the farmer most neglects. Nothing is more common than to suffer trees, both young and old, to weather the whole season through with scarcely a moment of labor or attention. Each has cost ten times more originally, and is worth now fifty times more, than a hill of corn or potatoes; yet who thinks for a moment of planting a hill of corn in a grassy field, and of leaving it untouched by cultivation from spring to autumn? Yet this is the treatment of a large portion of newly transplanted trees. All the remarkable, and in some cases almost incredible, instances of young trees coming soon into bearing, and of older trees yielding enormous and lucrative crops, have mainly resulted from the same good manuring and mellowing of soil which every good cultivator gives for his potatoes, carrots, and cabbages.

Orchards which now yield forty or fifty dollars per acre without care, might be doubled in the value of their annual products by the appropriation of a sum not exceeding five to ten dollars per acre. The advantages of good treatment are three-fold: young trees are thrown forward into bearing in less than half the time otherwise requisite; the products of large trees are doubled in amount; and the appearance and flavor are sometimes improved to a degree almost beyond belief. Some varieties of the pear, almost worthless under neglected culture, have been rich, melting, and delicious, when subjected to the genial influence of a deep, mellow, and fertile soil. Sometimes the same pear has been thus tripled in market value; and so great has been the change in appearance, as well as in flavor, that we have known even experienced promologists to be deceived into the belief that new sorts were before them, when they were really but old acquaintances grown under the most favorable influences.

Transplanting.—It has been estimated that, of the hundreds of thousands of trees yearly set out in orchards in the United States, not more than one-third ever reach a good bearing condition. The delicacy in the organization of all the parts of a young tree appears to be overlooked or forgotten. The roots are mutilated when torn from the ground, or four-fifths of their length cut off by the spade. They are crowded into small holes, dug in hard soil, and often not large enough to receive all the roots, such as they are, without binding, and the earth is stamped hard upon them. A large number necessarily perish from such treatment, and those which survive often remain in a sickly or feeble condition, from neglect in successive years.

Very opposite is the management of the skilful and successful cultivator. The trees are carefully lifted from the earth, securing a wide circle of spreading roots and finely branching fibres; they are next immersed in a bed of mud, to coat the surface, and prevent injurious drying; ample

holes are dug for the full extension of all the roots; fine and fertile soil is sprinkled in, while the small fibres are evenly spread out with the fingers; the earth is closely settled through all the interstices of the roots, not by stamping with the foot, but by pouring in a few quarts of water before the hole is quite filled.

As the subsequent treatment of the newly set trees is of the greatest importance, it may be well to enter more particularly into this branch of the subject.

Preparation of soil.—The first requisite of success and vigorous growth is a deep fertile soil. This may be secured for the tree, while young, by digging large holes and filling them (except in immediate contact with the roots) with very rich soil, or with short manure, well mixed by raking with common earth. Young apple trees, not larger than a carriage-whip, with holes seven feet in diameter, thus filled, have borne a bushel of fruit each the fifth summer. By the time the roots have run beyond the holes, the rest of the ground may have been enriched with manure, and deepened by ploughing. An admirable mode of deepening is first to loosen the soil as far down as practicable with a subsoil plough, and then to trench-plough this deeply loosened bed for the intermixture of manure. Trench-ploughing is effected by running a large common plough in the bottom of the previous furrow. The subsoiling admits this to a much greater depth than could possibly be attained without it. This preparation of the ground may be accomplished before or after planting the trees.

When the surface cannot well be prepared in this manner, a strip of ground eight feet wide, where the row of trees is to stand, may be prepared at less expenditure of labor. This method would indeed be always found of great use in clayey soils, which, otherwise holding water like a tub in the holes, would admit of drainage by means of the deep furrow through the centre. A small quantity of brush laid in the bottom of the furrow, before being filled, would allow the water to soak away for years afterwards.

Cultivation and mulching.—After a young tree is transplanted in the best manner, the first step only has been taken. Much will depend on the treatment it receives the first summer. Neither a tree nor a domestic animal can thrive and grow, if not well fed in its early years. The ground must be kept mellow and free from weeds for a distance of at least several feet around, because the new roots begin rapidly to extend themselves, and the roots of weeds and grass, if permitted, will also approach towards the tree, to rob it of its support. As soon as the dry summer season arrives, or sooner, the trees must be well *mulched*—that is, covered for several feet around with old straw, coarse litter, or leaves, not less than five or six inches thick. This keeps the top soil, throughout the hottest day, as moist as in the dew of morning, and consequently the under soil can never become dry. The moisture of the soil is thus preserved in the most even manner—incomparably better than by the irregular supplies of artificial watering, which not unfrequently do more harm than good, by causing the surface to bake, the water not penetrating to the roots below. For *cherry trees*, more especially, which often perish at midsummer, after having made a good beginning, mulching is of the greatest importance.

The writer has restored a row of young apple trees, which were so much injured by the drought as to cease growing and assume a sickly appearance, to freshness and vigor, by the simple operation of mulching,

although no watering was given, and no rain fell, neither at the time nor for some weeks after the improvement in their foliage became visible. A correspondent of the *Horticulturist* mulched fifty trees out of a hundred and fifty, all of which had commenced growth alike. Those which were mulched all lived. Of the hundred others, fifteen perished.

On the approach of winter, to guard against *the attacks of the mice*, which work under the snow, a little mound of earth, about ten or twelve inches high, should be thrown around each tree, to remain till spring. This has proved a complete protection in hundreds of instances, even where trees have stood in thick grass, the most tempting of all spots to these little depredators. Nothing is easier, and nothing more efficacious, than this simple remedy, which has also the additional advantage of stiffening the newly set tree against the action of the wind.

Keeping the ground well cultivated has already been urged. A few examples of its influence may be interesting. Some years since, fifty fine peach trees were set out, under the notice of the writer. The work was carefully done, and all lived. The ground was alike in quality, and a part was occupied with a crop of winter wheat, and a part with potatoes. The latter received, of course, good cultivation, with repeated hoeings; the former was not cultivated at all. On examining the trees after harvest, it was found that none of those standing in the wheat ground had grown more than *three inches*, and few more than one or two inches. On the other hand, of those in the potatoes, none had grown less than *a foot and a half*, and some had thrown out new shoots *two and a half feet long*. In another instance, the superiority of growth given by means of a hoed crop to the trees of a large bearing orchard of peaches, compared with those standing side by side in an unhoed crop of peas, was so striking as to be visible by the color of the foliage at a distance of more than half a mile. The worst piece of ground which it is possible for a young orchard to occupy is a meadow. We have observed whole hundreds smothered to death the first summer by the heavy grass which nearly enveloped them. Sown grain crops are not much better; but low cultivated crops, as potatoes, rutabagas, and carrots, are the best which can occupy the land. But all plants in all cases draw upon the strength of the soil; and hence clean, mellow, unoccupied ground is the best. A skilful cultivator found that his trees made about double the growth on clean unplanted ground, compared with those which stood among his field trees. Dr. Thompson, of Delaware, states that two rows of potatoes only, between the rows of bearing peach trees, have been found not only to affect the fruit, but to injure the trees. Hence the best market orchards in the country—those most famed for their splendid fruit, high prices, and heavy net profits—are kept clean by ploughing and harrowing, in connexion with the application of manure.

Some are perhaps now ready to exclaim, "We cannot *afford* to give so much attention to our trees—we cannot devote all this labor to them!" What! not afford to be economical? Not afford to save trees, after having paid for them? Then, by all means, buy only half the number, and apply the other half of the purchase-money in giving them the best possible care. An eminent and experienced cultivator has given it as his opinion, in which it must be admitted there is a great deal of truth, that if nine-tenths of the orchards of the older States were cut down, and the labor of taking care of them expended on the remaining tenth, more and better

fruit would be raised. No good farmer hesitates for a moment in bestowing all the required attention on his annually planted crops: why, then, should he not exercise the same wisdom in relation to that which is more valuable than any of them?

The difficulty of cultivation is usually much increased by the very inconvenient machinery used for ploughing near the rows. A two-horse team, with double whipple-trees, cannot safely approach nearer than three feet; and every ploughman dreads a task attended with lacerated bark on the one hand, and wide grassy "balks" on the other. A great improvement is made by placing one horse ahead of the other, like a canal-boat team, with a very short whipple-tree for the hindmost, whose draught traces may also be considerably lengthened, to admit of steering the plough to the right or left. With this arrangement, the task is easily and handsomely accomplished.

A wide error is committed in cultivating and manuring orchards by those who forget that roots extend far beyond the circle measured by the branches. When the trees become large, the whole of the ground is filled with a network of fibres. The larger and more obvious roots are near the base of the trunk; but the finer ones, which contribute the nourishment, are spread at great distances. Hence the whole surface should be kept mellow and receive the manure, and not narrow strips or pinched-up circles just at the base of the trunks.

SELECTION AND PARTICULAR TREATMENT OF DIFFERENT FRUITS.

In planting every orchard or fruit garden, the intended object must be kept strictly in view. For supplying a family the selection will of course be quite different from that of a market orchard. The former may be nearly the same in whatever locality; the latter will vary exceedingly with the nature and distance of the market and the resources of the planter.

It will be most convenient to speak in the first place of the former.

To supply a family of moderate size, 100 well managed and full-grown trees will afford an abundance with the best cultivation. At least, this number may be taken as a fair and full average, to be diminished or increased according to varying circumstances. They may be distributed among the different kinds in about the following proportion: 30 apple trees, 20 pear trees, 12 peach trees, 10 cherry trees, 10 plum trees, 6 apricot trees, 4 nectarine trees, 3 grape trees. As the apple and pear trees are to furnish a large portion of the year when other fruits are out of season, they compose one-half of the whole number. The cost of this hundred, at present nursery prices, would not exceed 30 dollars. To make the supply still more complete, a few additional rods of ground should be planted with strawberries, gooseberries, raspberries, and currants, the cost of which would increase the above sum to 40 dollars, the annual interest of which would not amount to the usual cost of replenishing a tobacco box for a year. This number of each kind, if well chosen, would furnish strawberries for a month, cherries for two months, raspberries for nearly a month, apricots for one month, plums for three months, peaches for two months, grapes for four months, pears for eight months, and apples for the whole yearly circle.

These might all be planted on an acre and a half of land; but if two

acres could be appropriated it would be better, as new trees must be occasionally set out to keep up a succession of good thrifty bearers. Plums, apricots, and nectarines are to be so arranged that they may be easily fenced off by themselves for the confinement of pigs and poultry to destroy and repel the curculio, as will be noticed on a future page.

To protect such an orchard from that peculiar and most serious evil, which prevails to a disgraceful extent in this country, namely, fruit stealing, a good secure thorn hedge should encircle the whole. In the extreme northern portion of the Union the English hawthorn has succeeded well, and some of the American species have done well further south. But neither of them is to be relied on when there is danger of the ravages of the borer, which has wholly destroyed some beautiful thorn hedges in the northern and middle States. There are, however, two hedge plants, not liable to any known disease or destroyer, eminently fitted to protect fruit trees from the spoiler. These are the buckthorn and Osage orange. The former is extremely hardy and poisonously bitter to any animal that attempts to feed upon it; the latter, although somewhat sensitive of severe winter frosts, will succeed well as *a hedge* as far north as the peach and Isabella grape will mature their fruits, and it is so profusely set with sharp thorns as to form a most terrific barrier. The only objection to a hedge is the time required for its growth. Its advantages are thus summed up by one of our distinguished writers: "It is like an impregnable fortress, neither to be scaled, broken through, nor climbed over. Fowls will not fly over it, because they fear to alight upon its top; and men and beasts are not likely to make more than one attempt to force its green walls. It shows a fair and leafy shield to its antagonist, but it has thousands of concealed arrows ready at the moment of assault; and there are few creatures, however bold, who care to 'come to the *scratch*' twice with such a foe."

The mode of preparing the soil for such an orchard has been already pointed out. The selection of the varieties is a matter of the greatest importance. The best and most delicious sorts are generally as easily grown as the worst; and some good varieties are more than twice as productive as others—an important quality to those who have but limited grounds.

THE APPLE.

This fruit, first in value for its easy culture, hardiness, general adaptedness to all places, and the long supply it affords, will grow on any land that will raise good crops of corn, wheat, and potatoes. No tree is more benefited by a deep and well manured soil. If well managed, the young trees ought to bear half a bushel to a bushel each by the fifth year after setting, and several bushels annually by the eighth or tenth year.

The varieties should be so proportioned as to afford a constant supply of fresh fruit for the twelve months. Early sorts last only two or three weeks, and should, therefore, be fewer in quantity than such as keep through the several months of winter and spring. If the earliest sorts commence ripening at midsummer, scarcely four months will elapse before the time arrives for securing the remainder within doors; therefore, the remaining two-thirds of the year are to be furnished with winter and spring varieties. It however happens that during the whole of autumn there is a great profusion of other fruits, as peaches, grapes, plums,

&c., which reduces the number of apples for this season, and renders a still larger proportion of long-keepers desirable. The following numbers, in a list of 30 sorts, may therefore be thus distributed through the different periods: 4 of summer varieties, 2 of early and midautumn, 4 of late autumn and early winter, 10 of winter apples, and 10 of long-keepers. Among the best and most productive sorts which have been extensively tried are the following:

Summer Apples.

Early Harvest, generally esteemed through the northern and middle States as the best very early apple; in Illinois and adjacent portions of the west it has not proved a good bearer, and in some of the eastern parts of New England it adds to this defect slowness of growth and liability to crack and blast. When the soil is not naturally of the most fertile character, it needs the best cultivation.

Sine Qua Non, a week or two later than *Early Harvest*—better, and more productive; not so extensively known, and being of a rather slow and crooked growth, not so popular among nurserymen.

Red Astrachan.—Remarkable for its great beauty, to which a part of its popularity is owing; rather coarse for the table, but unequalled as a summer stewing fruit. Introduced only a few years since, but appears to have done well whenever tried.

Williams's Favorite.—A very handsome summer variety, but hardly of the highest quality; very popular in New England, but has not been extensively cultivated elsewhere.

Summer Rose.—Small, remarkable for its delicate texture and agreeable flavor. In these qualities it is fully equalled and surpassed in productiveness by the *Early Joe*, a new variety, only proved as yet in western New York.

Sops of Wine.—This has proved a valuable, fine-growing, and productive sort in the northern and eastern portions of the Union.

The *Sweet Bough* is generally esteemed in many of the States as the best summer sweet apple. At the west it has proved unproductive. This defect of eastern sorts on very fertile soils may diminish as the trees grow older.

The *Carolina Red June*, unknown at the east, is regarded by many as the best summer apple for the west.

The *Bohanon*, a fine early fruit of Virginia and Kentucky, ripens during the latter half of summer.

In addition to the above, the *American Summer Pearmain* may be added as a fruit of much value, although very liable to blast in some localities; the *Early Strawberry* as a small, beautiful, and productive sort, not of the highest quality; and the *Golden Sweet* as a fine growing, productive, and good summer sweet baking apple.

Autumn Apples.

Autumn Strawberry.—So far as yet cultivated in New York and northern Ohio, this has proved a fine, beautiful, very agreeable, and productive variety. It ripens early in autumn, and will keep till winter.

Gravenstein.—Although not many years since its introduction, the

gravenstein has been widely disseminated, and has proved both at the north and south a variety of the highest excellence.

Porter.—Pre-eminently the autumn apple of New England; it succeeds well, but does not maintain fully its eastern reputation, in New York and northern Ohio; though slow in growth, fruit very fair, with heavy crops.

Dyer or Pomme Royale.—Perhaps unequalled in richness of flavor and fine texture combined, among all autumn varieties, but only moderately productive.

Hawley.—A new sort, proved as yet only in New York; large, with a mild and excellent flavor.

The preceding all ripen by the middle of autumn: the following, late in autumn; and in the more northern States they keep till mid-winter.

Rambo.—In the east and north, a fine, spicy, rich fruit, of moderate size; in the western States, of larger size, and a great and general favorite, although sometimes inclining to be water-cored.

Fameuse.—Very beautiful, of a refreshing but not high flavor; fine and productive at the west; much valued at the extreme north.

Fall Pippin.—Very large, very celebrated, and very excellent; moderately productive, especially at the west; much valued for stewing.

Belmont, or Gate.—This has proved very fine in New York, Michigan, northern and central Ohio, and Illinois, and worthless at Cincinnati. Varies exceedingly in its external appearance, with season and locality. An eminent pomologist at Cleveland says that, were he confined to one sort, he would choose the Belmont.

The following are among the best *autumn sweet apples: Jersey Sweeting*, *Autumnal Swaar*, *Haskell Sweet*, *Summer Sweet*, *Paradise*, and *Peachpond Sweet.*

The *Gloucester Cheese*, *Fall Cheese*, and *Full Queen*, or *Horse Apple*, are among the best varieties peculiar to the southern States.

Winter Apples.

Yellow Bellflower.—With the exception of some parts of New Jersey, and a few other localities where it fails, this apple is uniformly fine, and much esteemed from New England to the Mississippi valley. Too delicate for a market fruit, it excels in its fine texture and agreeable acid flavor.

Westfield Seek-no-further.—Appears to be uniformly fine in all localities, especially in the western States. At the east and north it is a good-keeping winter fruit; at the west and southwest it ripens late in autumn and during the first of winter.

Hubbardston Nonesuch.—This excellent and rich variety has not been much cultivated out of New England and New York, where it is a late autumn and early winter fruit.

Bullock's Pippin, or *American Golden Russet.*—Very popular through Ohio, Indiana, &c., on account of the extreme delicacy of its texture and its great productiveness. In some other localities it does not always ripen so as to become tender, and is too small for market.

Peck's Pleasant.—A new variety; a very fine, smooth, and fair, and productive sort, so far as tried in New York and New England, ripening during the first half of winter.

Baldwin.—The most highly esteemed and most celebrated New England winter apple. It appears to succeed equally well in New York. Its productiveness is remarkable; single full grown trees not unfrequently bearing 40 to 50 bushels. In the western States it becomes coarser, inferior in flavor, and subject to the bitter rot. It is an exceedingly variable sort, when grown under different influences, even on the same spot of ground; specimens are sometimes so different as at first glance to scarcely resemble each other.

Rhode Island Greening.—As celebrated in western New York as the Baldwin in New England, for its free growth and great productiveness. Forty bushels is not a rare crop for a full grown, well-cultivated tree. In the west it does not bear so well; but the trees may become more productive when they become older. As far south as St. Louis it ceases to be a winter apple, ripening before the close of autumn; and in the southern States it is changed to an early autumn variety.

Red Canada, known also as the *Nonesuch*, or "true Nonesuch," in New England, has proved of great excellence, so far as it has fruited—from Maine to northern Ohio—and will doubtless succeed well further west. It is regarded by many good judges as unexcelled in its rich and agreeable qualities by any winter apple.

Jonathan.—A beautiful, very fair, and productive sort in New York; but not as yet much proved elsewhere. In quality it is fine, but not quite equal to the Red Canada, to which it appears to be allied.

Esopus Spitzenburgh.—Far-famed for the extraordinary richness and spiciness of its flavor, in which it is nearly, if not quite, unequalled. The flesh is too firm, and to some the acid is too high, to be wholly agreeable. It is excellent for stewing. It maintains its high character through New York and the west, so far as tried; but is usually only moderate in the amount of its crops.

Swaar.—For a mild, agreeable, and very rich flavor, this is regarded by many as unexcelled, and by others as unequalled. It bears well; but on old and overloaded trees the fruit is apt to be scabby or blotched. In some parts of New England it loses its high character, becoming light and corky at the core.

Northern Spy.—Much celebrated in western New York as a handsome, fresh-flavored, spring apple, but not proved elsewhere. The young trees do not come soon into bearing, and the trees need higher and better cultivation than many other sorts, to prevent the fruit from becoming small and defective.

Roxbury Russet.—Succeeds well throughout the northern States; and, although good at the west, does not always bear well there. It is the most celebrated of all long-keeping sorts. It succeeds well, and maintains its fair appearance in all soils and with all kinds of treatment; but with rich culture it becomes larger and bears heavier crops. Small specimens are flat; larger ones become more conical, with short, thick stems. It is known in many parts of Ohio under the name of Putnam Russet.

English Russet.—Fruit rather small, from overbearing; keeps a year without difficulty; bears profusely in all localities. In Illinois six bushels have been produced from one tree the sixth year from setting out.

Newtown Pippin.—But little cultivated in New England; but well known from the Hudson to the Mississippi for its high and long-keeping qualities, and for a part of the crop being undersized, unless grown under

favorable influences. In New York it requires high culture to prevent most of the crop becoming small and scabby.

Pryor's Red.—This fine fruit is one of very wide adaptation, being very highly esteemed and widely cultivated in the south and west, and succeeding well as far north as 43° latitude in western New York.

Rawle's Jannet.—Like the last-named variety, greatly esteemed in the western and southwestern States. The fruit is very valuable for its long-keeping quality. The trees, by overbearing, produce many small or imperfect specimens. Not of the highest flavor.

Milan.—Known only at the west. It possesses a mild, pleasant, and agreeable, but not very high flavor, but is much esteemed, more especially in Illinois, for its fine growth and productiveness.

Winter Cheese.—Cultivated much in southern Virginia, and is one of the best early winter apples of that region.

Among the best *winter sweet apples* are the following: *Broadwell, Tallman Sweeting, Danvers Sweet, Baily Sweet, Ladies' Sweeting, and Sweet Baldwin.*

More space has been devoted to the preceding list, from the universal importance and the great value of the apple in all collections. In small gardens the number, of course, must be greatly reduced; but with the remarks appended to each variety, no person need fail of getting good sorts. The following circumstance may be stated as a proof of the extreme difficulty of prescribing exactly those which shall suit every one. At the first meeting of the American congress of fruit growers in New York city, a committee of nine was appointed to prepare select lists of fruits adapted to general cultivation. A vote in committee of over two-thirds was decided to be sufficient to place any fruit on the select list; yet, with all this liberal allowance, only *ten sorts* of apples could be agreed on "as worthy of general cultivation." The difficulty was not less with other kinds. When the pear, for example, was under consideration, (although nearly a *thousand varieties* have borne fruit in this country,) there were only *two sorts*—the Seckel and Bartlett—which received a *unanimous* vote in committee. The lists furnished in this article will therefore be understood as not intended to be perfect, nor as embracing all the best *local* sorts which may be known, but those generally which have received a *large vote* of the intelligent fruit-raising portion of the community. Most of them succeed well in the southern States, where they mature one or two months sooner than at the north.

THE PEAR.

This fruit, greatly exceeding the apple in the delicacy and melting quality of its texture, and in its delicious flavor, and also possessing the very desirable merit of a continuance for many months, would stand inferior to no fruit for value and importance, but for its most destructive malady—*the blight.* There appears to be no certain protection against this disaster; but its ravages may be greatly lessened or mitigated. Whenever the leaves on any branches suddenly turn black as if *scorched,* not a moment is to be lost. The branches must be immediately cut off, a foot or two below the affected part, and committed to the fire. If this practice is promptly and perseveringly adhered to, it will in most cases soon check the spread of the disease. The best preventive appears to be

a good soil, producing well-grown, healthy, well-ripened wood; too great a fertility inducing succulency and not hardiness, and a poor soil causing a feeble and not sufficiently vigorous growth.

Dwarf pears, made by pruning into a pyramidal form trees grafted or budded on the quince, possess several advantages. They come sooner into bearing, in most cases, than those on pear roots; they occupy but little ground, each tree not needing more space than six to eight feet, thus admitting many trees even in limited gardens; and they but slightly shade and injure adjacent crops. Hence no person should set them out who is not determined to give them the very best culture. Many sorts do not succeed on the quince.

Varieties.—A vast number of varieties of the pear have been collected at home and introduced from abroad, only a small portion of which are worthy of extensive cultivation. An eminent New England pomologist, who has fruited about one thousand varieties, gave it as his opinion that all that is valuable may be secured by a careful selection of about *twenty*. The following are generally esteemed as the best:

Summer Pears.

Madeleine.—The earliest good pear; needs house-ripening.

Summer Doyenné.—New; scarcely later; equal in quality; rather smaller.

English Jargonelle.—Large; good; but worthless unless ripened in the house.

Tyson.—A new sort, of great richness, delicacy, and excellence.

Rostiezer.—Perhaps the highest-flavored summer pear; rather small.

Bloodgood.—Usually fine; but in some places insipid.

Dearborn's Seedling.—Always fine; but rather small.

Bartlett.—Ripening at the end of summer, and passing into autumn; a great and almost universal favorite; large, melting, and good; the tree grows vigorously, and bears well while yet very young. An instance occurred under the notice of the writer, where a young tree, about six feet high, the second year from transplanting, bore about a peck of superb fruit.

Autumn Pears.

Washington.—Very sweet and high-flavored; uniformly fine; refuses a quince stock.

Golden Bilboa.—Fair and handsome; flavor a notch below the best.

Urbaniste.—Fine, and very melting; tree does not bear young.

Seckel.—Renowned through the pomological world as the highest flavored of all pears, but quite small in size. Tree very hardy, rarely attacked with blight; growth slow.

Heathcot.—A New England pear of high quality.

Louise Bonne of Jersey.—Famed for its productiveness, (on quince stock,) combined with a good flavor.

Onondaga, or *Swan's Orange.*—A very large, freely-growing, fine-flavored pear; somewhat variable in quality.

Beurre d'Anjou.—Newly introduced; quality excellent.

Autumn Paradise.—A new pear of exceedingly high flavor, and promising to become very valuable.

Beurre Bose.—Of good size and of very high quality; rather slow in growth; will not grow on the quince.

Flemish Beauty.—Remarkable for its fair and attractive appearance, combined with fine flavor. If there is any defect in this pear it is in its slight lack of high flavor when not grown under the most favorable circumstances. Fails on the quince.

Belle Lucrative.—As an eminent pomologist remarked, "*when* this pear is fine, it is *very* fine;" but it not unfrequently falls to an inferior quality. The best specimens probably approach as near *perfection* for a truly delicious pear as any to be found.

The *White Doyenné*, (or *Virgulieu* of New York, *Butter Pear* of Pennsylvania, and *St. Michael* of New England,) although it fails in some parts of the eastern States, is considered as the most valuable of all pears, all its qualities considered, in central and western New York, and succeeds finely at the west. The *Gray Doyenné* is similar to it in quality. The *Doyenné Boussock* is a newly-imported variety, resembling it in quality and appearance, but of larger size.

Beurre Diel.—Large, rich, but rather coarse; ripening quite late in autumn.

Winter Pears.

The *Beurre d'Aremberg*, (or *Aremberg*) and the *Winkfield*, (or *Vicar of Winkfield,*) stand first for productiveness; the *Winter Neles* for high flavor.

The *Easter Beurre* is the best long-keeping sort, ripening in spring: the tree needs high cultivation. The *Glout Morceau*, *Lewis* and *Prince's*, *St. Germain*, are also fine winter pears. The *Chaumontel* is an excellent old pear, but needs, at the north, the warmest and richest soil for the development of its good qualities.

The following succeed best on the quince: Louise Bonne of Jersey, Beurre Diel, Stevens's Genesee, Angoulome, Winkfield, Long Green of Autumn, Glout Morceau, Chaumontel, Easter Beurre, Tyson, and Beurre d'Amalis.

No fruit suffers more in quality from bad cultivation than the *pear;* and *winter* pears are rendered nearly worthless if neglected. Unless they grow in a good, deep soil, they cannot perfect their flavor. If the season is cold, the fruit will not attain maturity before the cold weather of autumn, unless subjected to the best treatment; or, if the soil be dry, its growth will be checked until too late to ripen well. Hence good management, even under an unpropitious sun, will generally give us much better winter pears than the most favorable skies without it. Manure, with a small proportion of ashes, well worked into the soil, will impart vigor of growth; and mulching, in connexion with frequent digging, will preserve the soil moist during any season of drought. A single trial is sufficient to convince any one of the economy of all the labor thus applied, by the large crops of finely-swollen, rich, and delicious pears which are the result.

The Chaumontel, Easter Beurre, and some others, are not easily injured by autumnal frosts, and should be left on the trees till the approach of cold weather. The Vicar of Winkfield, on the other hand, should be carefully preserved from frost.

A very essential requisite to the successful keeping of winter pears is

a good cellar, or fruit-room. It should be just sufficiently moist to prevent shrivelling on one hand, and rotting on the other; and the temperature should be low. The want of such a room, added to neglected cultivation, is one great reason why so many have failed with this fruit. In this room the fruit is to be kept till the time of ripening approaches, or until near the time the fruit is wanted; it is then to be placed in a warm room, with a temperature of about 70°, where in a few days it will change to a fine yellow, and become ripe and melting. In this way pears may be successively ripened off so as to furnish a supply through winter.*

THE PEACH.

The peach, usually regarded as the most delicious of all fruits, may be made to yield a supply, by a good selection of varieties, for more than two months. The earliest good sort is the *Early Ann*, but too tender for the extreme northern peach region. It is closely followed by the *Early Tillotson*—an excellent, productive, and more hardy variety, and well adapted to all localities, from Lake Ontario to the Gulf of Mexico. In Mississippi and Alabama it matures within two or three weeks of the first of summer. The Tillotson is immediately succeeded and often ripens with the *Serrate Early York*, a peach not inferior to it in value; after which, *Cole's Early Red*, *Cooledge's Favorite*, *Large Early York*, *Grosse Mignonne*, *Early Crawford*, *Morris White*, *Nivette*, *Bergen's Yellow*, *Old Mixon Free*, and *Druid Hill*, form an admirable succession of the best sorts. The *Heath Cling*, which does not always escape the frost at the north, becomes, when the fruit is thinned and well cultivated, the best very late peach, keeping on shelves in a cool, dry room, for two or three weeks after being gathered.

Stunted peach trees always produce much smaller fruit than those of vigorous growth; but the crop suffers even more in flavor than in size. No tree more imperiously requires regular pruning. If neglected, the branches gradually extend in length, the side-shoots perishing, until they become long, naked arms, bearing leaves and fruit only at their extremities.

To prevent this difficulty, and to preserve the trees for a long series of years in a healthy, vigorous condition, and in a neat, compact form, the *shortening-in* mode of pruning has been successfully adopted. It consists in cutting off, in winter or spring, about one-half or two-thirds of every shoot of the preceding year's growth all over the tree. If this is commenced about the time the trees begin bearing, and is annually kept up, they will always maintain a handsome, compact shape; the fruit will be larger in size, not less in quantity, and immeasurably superior in flavor. The work may be expeditiously done with a common pruning knife, with a short standing ladder.

The *peach worm* attacks the bark of the tree at the root, but, unlike the apple borer, never enters the wood. It feeds exclusively on the soft or pulpy inner portion, leaving the outside or hard shell which conceals

* The ripening, however, must not be attempted before the usual season of maturity. Unless the season has been long and warm, the Easter Beurre, for example, will not mature much before spring. If the store-room is quite cool, the ripening of early winter sorts may be retarded several weeks. Some require to be kept in tight boxes, when brought into the ripening-room, to prevent shrivelling.

it. Its presence is therefore indicated by the sawdust-like matter, mixed with gum, which is thrown out at the surface of the ground. In depositing its eggs, the parent or winged insect prefers to insert them where the outer surface is soft, as in young trees, or where the base of the trunk is shaded by grass. The grub kills the tree only when it girdles the bark.

It is easily destroyed by following it in its hole with a knife, and will always be found at the farther extremity. Hundreds of trees may be thus cleared by a single person in a day. Ashes or slaked lime, placed round the tree, although not an infallible remedy, and never driving out the grub when once lodged there, tends to repel its attacks.

The great and peculiar malady of the peach is the *yellows*. It is both contagious and incurable. Its first infallible indication in bearing trees, is the premature ripening of the fruit, often two or three weeks in advance of the usual time, accompanied with purple discolorations of the flesh. The tree afterwards assumes a sickly appearance, frequently with many small, wiry shoots near the centre of the head, and it soon perishes. The disease may be communicated by planting stones from affected trees, by the pollen from the flowers, by budding, by using a knife on a healthy tree previously used on a diseased one, and by contact of the roots. A tree, when attacked, should be grubbed up immediately and burned, and no peach-tree planted on the site for many years.

THE PLUM.

The great enemy to the plum is the *curculio*. It is a little beaked beetle, about as large as a pea-bug, which lays its eggs in the young fruit. The egg soon forms a grub or larva, which, eating into the pulp of the growing fruit, causes it to fall to the ground. If laid after the fruit becomes large, it induces premature ripening, and spoils it. This insect usually begins its work as soon as the blossom is off the young fruit. Its mark is a peculiar, little, crescent-like incision, termed by a certain Irish gardener, "the baby's nail," a most expressive phrase.

Out of a multitude of remedies, there are two which are more particularly useful and reliable. One is to confine pigs, chickens, and geese, in the part of the orchard occupied by plums. They should be sufficiently numerous to eat all the fallen fruit, thus destroying the grub, and lessening the danger of the next year's crop. Their presence also frightens away the beetle from depositing its eggs. Operating thus in two ways, they are usually sufficient, if in good numbers, to save the crop, unless the curculio is unusually abundant. When this is the case, the other remedy, which is jarring the beetles from the tree, must be combined with it.

The jarring is to be done with a wooden mallet; and to prevent bruising the bark, the blow should be made upon the short stump of a small branch cut off for this purpose. The insects drop at once upon white sheets spread beneath, when they are immediately detected and killed by a pinch of the thumb and finger. When crushed, this insect, unlike nearly every other, feels dry and crumbling, like Indian meal. The work is best done in the cool of the morning, when the beetles are more torpid and easily caught. In the heat of the day, they do not drop so readily, and often spread their wings and are gone before the thumb-and-finger manipulation can reach them. This method is sufficient of itself to save any crop, if unremittingly

applied; but it is distrusted by many who have lost their crops by an occasional intermission of a day or two.

Single trees, planted in much-frequented places, where this timid insect is frightened away, are often loaded with fruit without any care devoted to them.

There is a remarkable shrewdness in the instinct of this insect. It will not deposit its eggs, (unless hardly driven for a lodgment, from great numbers,) where there is not a fair chance for the welfare of the young larva. Hence it avoids puncturing fruit over a pavement, or on trees which lean over the water. But as trees cannot often or conveniently be protected in this way, the swine and poultry remedy will be found best for general use. The jarring can be resorted to as an auxiliary, or as the main remedy, where these animals cannot be allowed to run.

A malady which has destroyed the plum in large numbers, is the *black knot* on the shoots and branches. The cause is not satisfactorily understood, but the remedy is sure. It is to cut off instantly, on their first appearance, all affected parts, and to commit them to the fire. It may be requisite, indeed, in some instances, to remove large portions of some trees, before the evil is checked; but it is better to cut away a part than to allow the disease to spread without control and destroy all.

The following *varieties of the plum* have mostly proved general favorites among cultivators, and they will furnish a successive supply from midsummer till autumnal frosts:—

Primordian, Early Royal, Imperial Ottoman, Early Orleans, Green Gage, Lawrence Favorite, Lombard, Columbia, Bleecker's Gage, Purple Favorite, Purple Gage, Huling's Superb, Imperial Gage, Jefferson, Red Diaper, Coe's Golden Drop, Coe's Late Red, Blue Imporatrice, Jackworth Imporatrice.

THE APRICOT.

This golden, perfumed, midsummer fruit has been singularly neglected in many places where it would flourish in perfection. Its eminent merit consists in early maturity, ripening a month before the first peaches, while it is but little inferior to the peach in flavor. Its unwearied enemy, the curculio, whose habits have just been described, has doubtless discouraged many from its cultivation. By care in applying the remedies, full crops may be obtained, as it is scarcely less productive than the plum. It becomes, like the peach, feeble and stunted by age, if neglected, and needs the shortening-in method of pruning. When grown on a good dry soil, *with a subsoil which never becomes soaked with water*, it proves hardy, and succeeds well in Western New York, as far north as 43 degrees of latitude.

Varieties.—The *Golden* or *Fishkill*, the *Breda*, and the *Black* are the hardiest, most productive, and reliable for the North. The *Large Early* and the *Moorpark* are larger and of finer flavor, but less certain as to productiveness. The *Black* apricot is a distinct species from the others, and apparently as hardy as an apple-tree; and, although of second-rate quality, is quite valuable in the Northern States.

THE CHERRY.

The cherry, in the Northern States, is but little liable to any disease or enemy except the *cherry-bird*, which usually destroys the crop as soon as it

ripens. The only effectual remedy is powder and shot; they soon become fearful, and, after a few hours spent upon them for a day or two, have not unfrequently quitted the premises wholly for a week or two at a time. In the West, the cherry-tree often suffers from the burning of the bark, one of the best remedies for which appears to be in forming the head very low, or within a foot or two of the ground. The *heart cherries*, that is, the straight or regular growing sorts, do not succeed well at the South; the *Mayduke* and other *sour* varieties are much better adapted to that region. Dwarf cherries, budded on the *Prunus Mahalet* as a stock, often succeed where other trees will not, and they may prove valuable for this reason, in some localities. The following varieties of the cherry furnish a good succession for about six weeks, beginning with the first of summer.

Early Purple Guingue, *Doctor*, *Boyer's Early Heart*, *American Heart Knight's Early Black*, *Black Tartarian*, *Holland Biganean*, *Rockport Biganean*, *Black Eagle*, *Elton*, *Yellow Spanish* or *Biganean*; *Downton*, *Mayduke*, *Downer's Late*, *Belle Magnifique*, *Plumstone Morells.*

GRAPES.

The American varieties are the only sorts, with one or two exceptions, which may be successfully cultivated in the open air, in many parts of the Union. The foreign varieties mature in great perfection, if sheltered by a glazed house, either with or without fire heat. The best American grapes for the North, *Diana* and *Isabella;* for the Middle and Western States, *Isabella* and *Catawba.*

The limits of this article preclude a particular account of the management and treatment of hardy grapes. It may be sufficient to observe, that, like fruit-trees, they need a deep, loose, and fertile soil; and that, unless annually pruned down, so as to give shoots not older than the second summer for bearing the crop, neither high quality nor productiveness can be maintained.

Grapes may be preserved for months, if simply packed in kiln-dried sawdust, in close boxes or casks, and kept in a cool place.

SMALL GARDEN FRUIT.

A very copious supply of table delicacies may be obtained for the first half of the summer, by a few rods of ground planted with strawberries, raspberries, and currants.

STRAWBERRIES,

Under good management, will yield twenty quarts or more to the square rod. They should be kept cultivated in drills or strips, treating the runners as weeds; and after having stood in this way for two years, the runners should be allowed to fill up the previously cultivated strips or spaces, and then the old rows are to be spaded in. By this treatment, we get new plantations without the labor of setting out the plants.

Strawberries are of two kinds, *staminate* and *pistillate;* the latter cannot be relied on for good crops without the fertilizing presence of the former, but, with their presence, they are usually the best. Hence, wherever a pistillate sort occupies a bed, there should be another bed, or at least one row, of some staminate variety, side by side, and separate by an alley of a few feet wide, to prevent the sorts mixing by runners.

The best staminate sorts are the *Large Early Scarlet* and *Boston Pine;* the best pistillates are *Burr's New Pine*, *Hovey's Seedling*, *Old* or *Cincinnati Hudson*, and, in some localities, the *Black Prince.*

CURRANTS

May be greatly improved and more than doubled in size, by enriching cultivation, and by a sufficient pruning annually to keep the shoots from becoming crowded or stunted. The best varieties are the *Red* and the *White Dutch*, and there are some newer sorts of considerable celebrity; but even the old red and white currants, under the best management, will far excel any of them treated with neglect.

RASPBERRIES.

The best are the *Red Antwerp*, (if genuine,) the *Fastolff*, and the *Franconia.* These all need a deep, rich, and sufficiently moist soil. Where the ground is gravelly, and liable to suffer from drought, it should be deeply enriched, and the plants mulched during the season of ripening. Raspberries are greatly improved on gravelly land by *irrigation* in connection with mulching. We have known the stems to make triple the growth in a summer when thus treated, compared with others managed in the ordinary way.

RAISING FRUIT FOR MARKET.

The reader's attention has hitherto been directed to the supply which each family may afford itself, by a well-planted and well-managed fruit garden and orchard. This is the most perfect mode of enjoying fruit; there is a freshness and a delicious flavor in such as becomes matured on the tree, and used when plucked with the fresh bloom upon its surface, covering the melting juice of richness within, not to be found in any gathered before fully ripe and conveyed to great distances. There is also a peculiar satisfaction in deriving this supply from the trees which one's own hand has planted and reared, and which have become an interesting appendage to a rural home.

But it is to be remembered that there are many families in towns and cities, and in some other localities, who cannot, from the nature of the case, raise their own fruit. These must depend, for these useful delicacies, upon the crops of those who furnish them for market. Hence, it becomes the interest of both cultivator and consumer that every facility should be offered for an abundant supply. There is, perhaps, but one kind of fruit that has reached a desired extent in culture for this purpose—the peach. The first extensive orchard of this fruit, which was planted by Reeves and Ridgway, in Delaware, occupying 120 acres, proved highly profitable when prices were high. In one year, when the fruit sold from one and a half to five dollars per bushel, their gross sales were about sixteen thousand dollars. Since prices have fallen, a less sum has been obtained from the thousand acres occupied by the Reybolds, of that State, whose crops give constant employment during the selling season to a schooner and two steamboats. There are other fruits which have afforded heavy profits in market. A single orchardist on the Hudson is said to have sold *twelve thousand* dollars, worth of New-

town pippins in a year, a large part of which were sent to London and Liverpool. C. A. Cable, of Cleveland, obtained, in 1845, from an orchard of one hundred cherry-trees, twenty years old, more than one thousand dollars. An extensive cultivator of the grape, above New York city, has obtained several thousand dollars per annum by the sale of the crop, after kept till winter.

The strawberry has been raised only at Cincinnati in sufficient quantities to supply the demands of all. Two hundred bushels per day as an average for the whole strawberry season, or four thousand bushels in the aggregate, have been sold in that city in one year. One cultivator alone sent in one hundred and twenty-five bushels in a day, requiring sixty hands to gather them.

The great number of trees which have been set out in all parts of the country, have led many to the inquiry, "Will prices be maintained? Will not the market be surfeited?" To answer these questions, let us glance at a few facts.

Perhaps the only instances which have already occurred of a fall in prices, are the peaches of the Eastern cities, and the strawberries at Cincinnati. But these are both perishable fruits—they must be consumed as soon as purchased, or else be lost. Fifty times the amount of *keeping* fruit would find consumers, for it may remain on hand for a month together. But a single city no longer becomes the limited market for long keepers; the whole country is open; and no night-and-day labors are needed to bring them into market before decay seizes them. Railroads and canals will carry them to any part of the Union—steamships will transport them to the millions of Europe. The only requisite is so to cheapen the supply that all may enjoy them. The Newtown pippin has already found its way to the London markets; but the present amount, compared with the quantities destined to flow there, when orchards are profusely multiplied and facilities for conveyance increase, are but as the dripping rill to the mighty river. The price of good winter-apples through the great apple region, Western New York, has rather advanced than fallen during the past thirty years; but it has been shown, in a former part of this article, that even at half the present prices, orchards would be eminently remunerative. How long it may be before such a result takes place, while hungry millions for the whole hungry year are ready to consume them, is very uncertain.

We may, therefore, safely conclude that the time has not yet arrived for land-owners to withdraw their attention to an increase of their orchards; and while the population of the country and facilities for conveyance are multiplying so rapidly, no investment is likely to prove more permanently profitable or beneficial to the public at large.

It is easy to give a list of varieties for the private garden, but much more difficult to name those which may be best for market in all localities. There are so many circumstances to be considered in adapting the supply to the public demand, that no person can well undertake it, with the greatest prospect of success, without a previous thorough acquaintance with the best varities, to be obtained only by their actual cultivation on his ground, and from observation.

MANAGEMENT OF WHEAT HARVEST.

BY EDMUND RUFFIN, ESQ., OF VIRGINIA.

In preparing the following statement, it was my purpose to present merely my own practice and the opinions founded thereon; and not the practices or opinions of other farmers, whether better or worse, unless by special reference. Neither do I presume to offer my practice as the best example for other farmers; but simply as the procedure which my circumstances have induced or compelled me to adopt, and which the general results have seemed to sanction or approve.

The proper time for reaping wheat is when the grains have just reached the "*doughy*" condition; or when they are so soft as to be easily mashed between the finger and thumb. The interior of the grain is then a soft, glutinous, adhesive pulp; but having no remains of the white fluid, or "milk," the presence of which indicates the preceding and too immature condition. But as no considerable space (if even the smallest spot) of wheat can have all the grain at once precisely in the same "dough state," I do not wait for it to be complete. It is safe to begin to reap when not more than one-tenth part of the heads (of latter growth) in any one place of sufficient size have still a little milk to exude from the mashed grains. And in the progress of reaping the more ripened wheat, the same indication and rule govern as to any greener spots or margins. The greener grain, still showing a very little milky fluid, and the pulp softer and less glutinous than of the "dough state," will doubtless lose something in shrinking. But such loss I have never found appreciable in the general result. When reaped in the proper "dough state," I do not believe there will be any loss of size or weight of the grains by shrinkage, more than if left standing until dry—while there is great gain from the earlier reaping, in forwarding and securing the harvest, and thereby avoiding the hazards of bad weather.

The thus reaping wheat as much as possible in so green a state, has been condemned by the opinions and even experiments of many farmers, some of whom I respect highly as authority. Most of such experiments were comparisons made of different heads of wheat, apparently equal in size or number of grains—or of certain larger numbers of grains separated, of two samples—the one cut off green, and the other suffered to stand until fully ripe and dry. All such results are liable to objections. 1st. It is very difficult, if not impossible, to make fair and accurate comparisons as to size and quantity of any two heads of wheat, the one cut off green, and the other left to stand until dry. 2d. Even if such comparison could be perfectly accurate, still it would be made of wheat saved from every damage or danger from bad weather—and not exposed, as a large part of every crop must necessarily be, even in the most favorable season for harvest.

Now, even if it were true (which however I do not admit or believe) that a head of wheat cut off in in the dough state lost something of the size and weight it *might* attain if left to stand until quite dry, and then secured without any damage from rain—still it might well be that such (possible) loss would be more than compensated in the avoiding, by early reaping, the heavier losses of wheat which *always* attend the latter part of a protracted harvest. This is the true question. Even with beginning to reap

wheat in the "dough state," it is rare that a full crop of wheat can be all secured before much waste has been suffered by over-ripeness, aggravated by bad weather. Under such impressions, I have not resorted to the tests of any comparative weighings or measurements, or particular experiments. But in my general experience of reaping thus early, extending from 1822 to 1851, I have never had reason to suppose that any loss, either general or particular (unless in the small proportion of "milky grains") has occurred. The general gain has been believed to be very considerable, and for every harvest; and one particular crop was by this early reaping nearly all saved, just in advance of a long rainy spell, which destroyed fully half of the neighboring crops, then mostly standing. This occurred nearly thirty years ago, when the general practice was to begin reaping later than is now usual on nearly all wheat-farms.*

Aiming then to reap wheat as early as is safe, the operation is usually begun as soon as the most forward spots, of a few acres in size, have reached the "dough state." Sometimes the straw and chaff are yellow, and riper in appearance than the grain; in other years, the green color of the plant and its sappy condition more or less remain. Different measures of time,

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* From memoranda written at the time of the occurrences, I am enabled to state the days of beginning to reap wheat for a number of years. For the intervening years, omitted, no such note was made, or preserved. Coggins Farm, the first subject of my labors, is high, hilly, and mostly sandy land, on the south bank of James River, and about 24 miles S. E. from Richmond. Marlbourne Farm, 13 miles N. E. from Richmond, and on the south of the Pamunkey River, is low and flat land, the soil of various textures, but a large proportion very stiff. Vegetation generally, as well as the first ripening of wheat, is always some days more advanced on the former than the latter farm—though they are not more than 25 miles apart.

Reaping wheat begun at		Coggins.	Marlbourne.
1818, 1819,	Golden chaff wheat, and ripe	June 25th 23d	
1822,	Mountain Purple straw and green,	8th	
1823,	"	13th	
1824,	"	11th	
1825,	"	10th	
1826,	"	12th (*a*)	
1827,	"	16th	
1828,	"	12th	
1829,	"	19th (*a*)	
1831,	"	16th	
1836,	" (crop almost destroyed by rust)	27th (*b*)	
1837,	"	16th	
1839,	"	13th	
1840,	"	8th	
1841,	"	21st	
1842,	"	13th	
1843,	"	19th	
1844,	"	3d	
1845,	"	6th	11th
1846,	"	8th	11th
1847,	"	14th	14th
1848,	"	7th	7th
1849,	" (All good or forward growth cut down by freezing, 15th to 17th of April,)	21st	20th (*b*)
1850,	"		19th

From 1822 to the present time, the same kind of wheat has been cultivated, first known as the "Mountain Purple straw," and more lately distinguished as the "Early Purple straw." During all this time, my usage and aim have been to begin to reap as soon as enough wheat had reached the "dough state." But a few of these beginnings (marked *a*, *a*) were not made quite so soon, because of the pressure of other work; and in some others (*b*, *b*,) the ripening of wheat was much retarded by peculiarity of season or disease of the crop.

according to such different circumstances, will be required, previous to the subsequent operations of binding and putting the sheaves into "shocks."

I use for reaping only the scythe and cradle. Since coming to my present farm, I have had great difficulty in getting the wood-work of cradles made heavy enough. Cradles made as light as usual hereabout are more laborious to work in good wheat, and less efficient, than heavier cradles. My scythemen complained loudly of the lightness of the ordinary cradles, which I was compelled to use for several years.

When wheat through the country was generally a very light growth, the reapers were taught to catch the wheat cut by each sweep of the scythe, from the cradle with the left hand, and then let drop the handfuls on the ground. This was best for such very thin wheat. But for a heavy growth, it would be better if our men could empty the wheat from the cradle, or "strew" it regularly along the row, as is done in some other parts of the country. My practice, then, of "handing" the wheat from the cradle is not deemed the best, but is the result of the old and inveterate habits of the laborers. It would doubtless be an improvement if we could introduce here, for all heavy wheat, the "strewing" instead of "handing"—and also the cradles best suited for the former practice. Perhaps a still greater benefit may be found in the substitution of reaping-machines—which even now are used by most of the good farmers of my neighborhood. But because of their great liability to get out of order, the difficulties of working them, and especially my own ignorance of machinery, I have feared to attempt the use of a reaping-machine.

After getting into full operation, each reaper is followed immediately by a "binder," who ties up into sheaves all the wheat cut by the reaper. In light or ordinary wheat, this is light work for the binder. But it is heavy service, if well performed, in heavy wheat, or if following a scattering and wasteful reaper.

The wheat is thrown by the reaper, as "handed" from the cradle, in piles of one, two, or three handfuls together—evenly as may be, and the stalks lying at right angles to the direction of the reaper's row. Each binder carries in the right hand a very light wooden rake, with six teeth, and the handle 18 to 22 inches long, which is conveniently used to straighten and gather up the wheat for the sheaf, and also to rake up most of the scattered stalks. The sheaf is made no larger than a band, made of a single length of the stalks of wheat, can securely tie up; and, if the straw is very green, or moist with dew or rain, still smaller size of sheaves is required.

In the beginning of reaping, usually there is not much wheat ripe enough, and there is no need for the most rapid work; and the perfect safety of the first reaped wheat is more important than greater speed in the progress of the work. Then, contrary to the later and general practice, the reaping sometimes proceeds some hours in advance of the binding. When so separated from the reapers, the binders always work much more slowly. But this loss can then be submitted to, for the attendant benefits of giving some time for the straw (and any intermixture of weeds) to wither, and partially dry by exposure before binding. The bands then tie better; and, as the green straw has then withered and shrunk somewhat, the band will not become so much looser afterwards, by the further drying of the sheaf.

The sheaves are left lying on the ground, in the rows where bound, but none in the water-furrows. There they remain, in the beginning of harvest, and, if rain is not threatened, from 3 to 8 hours (besides the whole night,

if intervening) after the binding—or about a day later than the reaping—when the sheaves are brought together and put into "shocks" or "hand-stacks." The delay of this operation (and which is only permitted for wheat still green, and also in settled fair weather) permits the wheat to dry something more, and thereby is safer from becoming mouldy in the centre of the shock. The sheaves also are of less weight to the bearers, (who are mostly small hands,) and they stand more firmly in the shock. If an unexpected rain should occur, there will rarely be any damage done to sheaves caught lying on the ground—and still more rarely if the wheat is green and fresh. And this observation applies to sheaves so caught by rain, in any state of dryness and any later time of harvest. If the earth is dry, and absorbs the rain as it falls, so that none shall continue to soak any heads of wheat—and if the rain, even if heavy, does not last more than a few hours—the sheaves will mostly dry as they lie, and without any damage. This result has been found after (undesigned) exposure for 8 days, during which a heavy rain had fallen, and had cleared off. But much delay and risk of exposure to rain need not be permitted. Should a drenching or long-continued rain catch sheaves lying on the ground, they should be soon afterwards set up in small "stooks" of 4 to 9 sheaves each. They will dry in that state, if drying weather follows: if the weather continues damp, the stooks must be shifted, so that the wet sides of the sheaves shall be turned to the outside of the stook. But such damage, or any danger of such, has never occurred to me, except in the remarkably wet harvest of 1846. Then, and in any such long-continued wet weather, no method and no precautions can prevent great loss. Then, indeed, the sheaves sprouted when left only 24 hours on the thoroughly wet ground. But also in stooks previously set up, and even in the still standing stalks, much of the grain sprouted.

The things most important for the perfection of harvest-labors are: 1st. That the wheat shall be cut well, and laid evenly and regularly by the reapers; 2d. That the binders shall gather up the wheat without too much scattering and waste, and tie the sheaves securely; and, 3d. That the shocks are built and roofed over well, so as to stand erect, and to exclude rain. Of course, there must be more or less of short-comings in the efforts to reach all these desired ends.

The operations of reaping and binding need not be described, and, indeed, would scarcely admit of description. As to the building of shocks, perhaps directions may be advantageously given to those who need such instruction. My own heavy early losses, which were suffered from my want of knowing how to build shocks, would be enough to impress on me the importance of better knowledge. And even at this much later time of generally improved practice in harvest operations, there are more than half the farms in Lower Virginia where a wheat-shock has never yet been properly built.

It formerly was my usage, as it still is of some other and better farmers, to put all the sheaves, (of green wheat,) as fast as bound up, into "stooks" of 8 or 10 sheaves each. These stooks are made by setting 3 sheaves on their stubble ends, about 12 or 15 inches apart, on the ground, and forming, by their position, a triangle—the heads of the sheaves being brought together to a central point. Then 3 other sheaves are set around and in close contact, each one on the ground, at the opening between two of the inner 3 sheaves. A few more may be added, to the outside, to give proper size and shape, as desired, to suit the weather. Each stook, when finished, presents, roughly, the shape of a small cone. In such stooks, the wheat

will usually cure well; and, after a day or two of good weather, may be put into shocks of the largest convenient size.

But I object to, and have abandoned this plan of general stooking, (for green wheat,) because of the labor of twice handling and moving, and the greater waste, by shedding stalks from the sheaves, in these handlings. If the weather should be good, the sheaves would be as safe if left lying separately on the ground. A light or transient, though much heavier rain, would not hurt the sheaves, either in stooks, or lying on the ground. If a storm of rain and wind occurred, the stooks would be nearly all overthrown, and the wheat would be but little safer than if the sheaves had been lying on the ground. And, in case of such a storm, or of any considerable rain, stooks may and ought afterwards to be set up, to permit the sheaves to dry. It does not often happen, from such an occurrence of heavy rain, that I lose any thing from the omission of building stooks before the rain occurs.

In beginning to build a "shock," the first 3 sheaves are set up as in putting up a stook. Others are set around the first, in a circular form, the "butts" or stubble ends of the sheaves, set firmly on the ground and close to the inner sheaves, and the heads pressed inward towards the central point. This foundation is thus continued to be enlarged until of sufficient size, (according to the length and dryness of the wheat.) This first part of the shock approaches in form a truncated obtuse cone. The inward inclined heads of the opposite outside sheaves are about $2\frac{1}{2}$ to (for largest sizes) not more than 4 feet apart. The sheaves of the latter rounds should have been firmly pressed inward, and all set closely together, so as to be as compact as possible. The roofing is begun by setting the stubble end of a sheaf upon and partly into the bands of two of the outside sheaves; and so continuing a course around—putting each sheaf over the joining of two others below it, when spaces permit. These sheaves, forming the first course of the roof, have also their heads pressed inwards to the centre; and they are prevented from slipping down by some of the stubble ends of every sheaf sticking into the bands of the lower sheaves. This first course serves to reduce the amount of *cutting off* before exhibited, but still preserves the general form of a truncated cone, rising higher than before. Another course of sheaves is then laid on in the same way, rising still higher and approaching nearer to a point. The sheaves are laid on in the manner of shingles or slates to cover the roof of a house. Each sheaf covers the "break" between the two of the course below; and the heads of every sheaf are covered by the straw end of the next course above—so that no heads (except of the "cap") are exposed to rain, so long as the shock does not tumble, or lean so much as to disorder its roofing, and admit rain.

The last course carries the sheaves to a point, as high as the builder, standing on the ground, can well place them. The shock is then (or ought to be) nearly a perfect cone, of height greater than the diameter of the base. The last 6 or 8 sheaves used to bring the top to a point, should be of smaller size. And as the greenest wheat (occurring in spots) is bound into particularly small sheaves, these serve well for this topping. Moreover, by being so exposed to air, if put up as soon as reaped, these sheaves of green wheat will cure safely.

The "capping" and finishing of the shock is next to be done. For this, a very large sheaf is made, by tying a band of double length securely around and near to the stubble end of the wheat, put evenly together. The sheaf is then placed on the ground, resting on its stubble end, and so held while

the laborer bends down at the band, and outward, all the stems, by handfuls, beginning at and around the outside, and so proceeding around until reaching the central stems. Being bent outward, the heads then are the outside of a circle, lying on the ground. In this flat outspread shape, the sheaf is lifted by a fork stuck into the tied part, as high as over the point of the shock, then placed thereon, reversed, so that the tied stubble end shall make the pointed top of the cap, and the loose stems of the cap-sheaf shall fall upon and cover all the upper part of the cone. The sheaf is properly adjusted; and some of the heads of wheat, hanging downward, are fastened into the bands of the underlying sheaves, on four opposite points, so as to prevent the cap being easily blown off by high winds. A light ladder, 3 to 4 feet long, set against the shock, will aid the capping of large shocks.

If properly so built, no heads of wheat will be exposed to rain, except those (hanging downward) of the cap-sheaf. And though these few are wetted by every rain, they are also so exposed to the air and sun, that they soon dry—and will keep sound in any but wet weather of unusually long continuance.

According to the size of such shocks, and to the quality of the crop, they will hold from 2 to 5 bushels of wheat; or more usually $2\frac{1}{2}$ to 4. If the weather is threatening, and if sheaves are very green, or are actually somewhat moistened by rain or dew, it will be safe and proper to put up the wheat in small shocks. When this has been done for fear of worse weather, I have found both green wheat and damp sheaves to cure well. And in other cases, where no danger was feared, and less caution used, I have had both green wheat and wheat damp (from previous rain or dew) to become mouldy, in straw and chaff, in the middle of the shock; but without any other apparent damage to the grain than some discoloration. Some of the most mouldy heads, and still moist, as found when beginning to thrash wheat, were tried as to their power of germination; and of 100 such grains, 95 sprouted.

But, though wheat may thus bear to be shocked in a green and even in a wet state—and though it is expedient to do so in particular cases, when a worse condition is feared, from the continuance or threatened approach of wet weather—still I prefer to avoid such procedure in ordinary practice. It is not only necessary that wheat shall cure and dry finally and thoroughly in the shock, and free from damage in passing through its "sweating," (which every shock goes through,) but it is also very important that the wheat shall be dry as early as the time to begin threshing. If this operation has to be delayed, because the wheat is not then thoroughly dry, the completion will be late, and the shocks exposed to much more damage from a rainy spell.

The intervals of time, as above stated, between the reaping and the binding, and between the binding and the putting into shocks, are deemed proper, and allowed only in the early part of harvest, when the wheat is green—or afterwards, in case of wheat being reaped when moist with rain or dew. Of all these causes of danger, or damage, the moisture remaining from heavy dew seems to be the worst. The thinnest growing wheat, and still more if it is "dead-ripe," and therefore cuts badly when dry, should be reserved for reaping in the mornings, while dew remains. A light dew need not stop binding. But if there is heavy dew, and it is necessary to reap during its continuance, the wheat ought to lie long enough to nearly dry before being bound, and still longer before being put into shocks. The

heaviest dew need not delay the building of shocks, of sheaves bound dry the preceding day—as their moisture will be only on the upper outside.

Having considered these subjects of exceptions to general operations, the latter, though far the more important in amount, can be despatched in fewer words.

Usually, before half the harvest labors are over, the remaining wheat is so ripe, by the time it can be reaped, that it may be shocked immediately. Much earlier, (if, indeed, not from the beginning,) the binding should have followed immediately after the reaping. After being thus brought together, there is thereafter permitted as little interval between these different operations as possible. Still, in settled fair weather, there will be no objection to there being enough sheaves left on the ground over-night to occupy all hands, except the reapers, in putting them into shocks, the next morning, during the continuance of dew too heavy to permit binding. At such times, the younger men not yet accustomed to reap may learn to use the cradle, in the lightest wheat.

When the labors of harvest are in regular progress, there is but little to be feared from rainy weather, except so far as it will delay the completion of the work, and injure the standing wheat. All the reaped wheat may be (if desired) safe in the shock within two hours after being cut down. If sudden rain threatens, by aid of the reapers and binders, all can be secured in half an hour. But the danger from delay of reaping, and of rain, to the yet standing and already fully-ripe wheat, is very great; and this danger is tenfold increased by a late beginning of harvest. By beginning to reap the wheat when green, there is an advance of 4 to 6 days gained; and, if afterwards interrupted, even for as long a time during the latter part of harvest, by a spell of rain, the farmer is then precisely where he would have been without that delay, if waiting at first for his wheat to be fully ripe and dry. On the other hand, if after so waiting, such a rainy spell were then to occur, the crop would be nearly destroyed. If not actually sprouted, the quality of the grain would be injured by every wetting and drying—and, even if not lodged in mass, the wheat would have its heads so turned down, that the loss in reaping would be enormous.

My harvest labors are too heavy for my limited force, and therefore they cannot be executed very perfectly. Especially, there is always great scatterings and waste of wheat by badly-operating cradles, or some awkward reapers, and which cannot be, or is not, raked up and saved by the binders. No laborers, either reapers or binders, worth having, can be hired here; and all who seek for such employment in harvest, studiously avoid all farms where there is any heavy growth to reap and no whisky is permitted to be used by the laborers. I have ceased to seek for or to obtain any aid of harvest hirelings.

To the foregoing general statements of practice and opinions, I will append the particular facts, as to weather and operations, of two different harvests. The statements are extracted (in substance) from my farm-journal. The entries concerning or indirectly relating to harvest operations or difficulties only will be presented. The two statements are selected from the number contained in my farm-journals, for the following reasons: Both the crops referred to were harvested within the few past years, so that most farmers may recollect the weather and other general circumstances of each time: In one of the cases, the harvest was remarkable for the worst weather I ever had to encounter; and through the other there was generally fine

weather, but the crop was unusually heavy, and the labors were protracted, and thereby the difficulties and risks much increased. A tabular statement of my latest harvest will also be added. The manner of proceeding, in all cases, agreed with the foregoing opinions and directions:

Harvest operations on Marlbourne Farm. Extracted from my Farm-journal. 1846.

[The spring season of 1846, to the end of May, had been generally and remarkably rainy.]

"*June* 1. Thick mist all forenoon. At night, heavy rain.

"3*d*. Driest and lightest part of corn-field just fit to be ploughed. [Continued generally cloudy, or misty, and cool, with some light rains in all the next five days.]

"9*th*. Slowly raining from 7 A. M. until late at night. Very cool.—The wheat seems ripe enough to begin to-morrow; but, in the very bad condition of the corn-field, I must give it another day's work before leaving it.

"10*th*. Still cloudy—and all day nothing but variations of thick mist, thin drizzle, or, in the cessations of both, damp and cold air. [Of course, better weather to begin harvest was waited for.]

"11*th*. Steady rain from last night to noon, making the corn-field everywhere too wet for working. Afternoon, began to reap wheat, as soon as the rain had dried from the straw. Continuing cloudy—and several scuds of misty drizzle, which did not cause any cessation of the work. Binding the wheat into sheaves, as fast as reaped, and setting up in stooks immediately after.

"12*th*. Raining heavily last night—and continued at intervals and slowly for nearly all day, though worse in forenoon. Notwithstanding, despairing of doing better by waiting, reaped and bound wheat about 6 hours of forenoon. Then, fearing to proceed, discharged the hands, because there was no other work for them. Never had I a corn-field so much needing both ploughing and weeding, and yet it is too wet to be touched, when weather ought to forbid reaping wheat. The condition of both crops, but especially the wheat, is awfully alarming. It is now nearly throughout just in the state to begin reaping; and, even if good weather were now to come, the wheat must lose much before the harvest can be entirely finished. But there is every prospect of bad weather continuing; and if so, of ruin to the crop, whether cut down wet, or left to stand, waiting for drier weather. Besides all the previous rains, and cloudy weather, there has not been any sunshine during the last five days, and there has been more or less rain on all of them.—Quite cold.

"13*th*. Steady rain, and sometimes falling heavily, from morning until noon—and showers at intervals afterwards, into the night. Thick damp air, or otherwise mist, at all other times. At 2 P. M. began to stook the sheaves cut and bound yesterday forenoon, which in part had been left on the ground when the hands were driven off by increase of rain. I supposed it did not matter whether the wheat lay on the ground, in sheaves, or was in stooks, for 24 hours only after being reaped, remaining wet in both cases, and the weather being so cool. But it was found that some of the wheat on the ground had already sprouted—and the same surprising and disastrous result may now well be expected for all, without a speedy change to drying weather. Even of the standing wheat the grains are much swollen by moisture, as if going on fast to sprout. Yet it was but in the dough

state, and yesterday, if weather had permitted continuing to reap, J—— doubted whether there was enough wheat then ripe enough. As soon as the little stooking required was done, again discharged the hands, having no work for them. At late bed-time, still slowly raining.

"*Sunday*, 14*th*. Misty, cloudy, and always damp air until noon. Afterwards, some sunshine. Light scud of rain in evening, with threatening clouds and thunder. Turning warmer, found the sprouting progressing in all the stooks—and more in those of the wheat cut and sheaved wet on the 12th, and stooked on that and the following day. Would have thrown open the stooks to-day, if clear and settled weather. As it was, the risk was too great.

"There are numerous sprouted grains of the ripest *standing-wheat!* And all the sprouting is not so alarming as the apparent condition of all the other grain of the crop; which is so swollen and softened by the continued moisture, that it seems like wheat which has soaked in water for the purpose of making starch. And even if it should now dry soon enough to prevent further sprouting, I fear much that the gluten may be mostly converted to starch, to the great injury of the wheat for sale, and also to its power of germination. The damage is greatest in the ripest wheat. As my kind [a forward purple-straw, red-grain wheat] is 5 to 7 days earlier in ripening than any ordinary kind, (except the May and Mediterranean,) it is now just so much advanced towards injury or destruction, more than the later kinds.—Warm.

"15*th*. Threatening all day, but no rain. But even the expectation of rain is a serious impediment to the operations desired, under such difficulties. Began early to reap—and (for fear of more rain) binding immediately, and putting into shocks soon after. After dew was off, opened all the shocks, turned the inner and wetted sheaves outside, in new and smaller stooks—reducing the number of sheaves in each from 8 or 9 to 4 only. The sprouting very bad—and no drying yet of the interior of the wet sheaves. The grain of the standing wheat was still very soft this morning. But the sunshine dried it fast; and before night, some grains were shattering under the stroke of the scythe. If this day had also been rainy, the crop must have been nearly or quite ruined, by the general sprouting or later rotting of the wet grains. As it is, the loss is already great. Shocked nearly all the wheat reaped to-day. All that reaped before, remaining still exposed, and wet, in the small stooks.

"16*th*. Warm, and generally clear—but sometimes cloudy, and one very sudden and transient shower, which fortunately did no injury. Kept to-day's reaping shocked nearly up to the scythes, except the wheat cut early in the dew, which remained in stooks.

"17*th*. Finding that the wheat reaped wet would not dry in stooks of more than 4 or 5 sheaves, set up the sheaves singly. Shocked all the reaped wheat by night. The wheat cut on the 11th, when dry, has kept, and dried in the stooks, with but little sprouting or other damage; and with no other care than shifting the position of the sheaves on the 15th, and reducing the size of stooks from 8 or 9 to 4 or 5 sheaves. The wheat cut wet fared much worse, and was not entirely dry even after being to-day exposed in sheaves standing singly—though generally it is now fit for keeping in the small shocks into which it was put. Very hot sunshine, interrupted by passing clouds. At night, light rain.

"18*th*. Clear until afternoon, and hot. Then, heavy cloud, with sever

thunder and lightning, and violent wind. Slow rain began at 5 P. M., which stopped reaping for two hours. Afterwards, reaped about an acre, in the rain, without binding. The building of shocks kept so near the scythes, that all was done by the time the rain began to fall steadily. But the furious wind, just before, had blown off some caps and top sheaves of other shocks, and I fear has done much damage.

"19*th*. The violent wind of yesterday has been more injurious than was anticipated. Many stalks of corn are broken off. The standing wheat before had more or less leaning from N. E., the direction of the previous storm. The wind of yesterday was from the opposite quarter; and it has reversed and increased the leaning of all the wheat, and has broken numerous stalks everywhere, so that the heads are too low to be saved in reaping. The caps, and even some of the roofing sheaves, of many shocks blown off, or displaced, which will require much trouble to repair.—Clear through greater part of the day. In afternoon, another heavy and alarming cloud, which, however, mostly passed by, causing only slow and light rain, from before 6 P. M. to dark. The day's previous reaping all shocked, and no wheat exposed, except the shocks damaged by the wind, and not yet repaired.

"20*th*. In afternoon, again heavy and alarming thunder-clouds, and rain in sight, falling along an extensive line, for two hours. Fortunately, none reached here until nearly dark, and then but a light shower. Nearly all the wheat shocked up to the reaping. The waste very great, owing to the dead-ripe and dry state of the wheat, and the numerous broken and bent stalks. There is, however, but little shattering of the grain, owing to its being so generally shrivelled and badly filled. This defect being caused by the quantity of rain during the growth, is greater where the land is lowest and richest, and the straw most luxuriant. The very thin 'stand' of the wheat also served greatly to increase this evil. [Nearly all the seed-wheat had been more or less injured by being washed in brine; and about one-fourth, or nearly, did not come up.]

"*Sunday*, 21*st*. Very cool since last evening's rain. This the first day without some rain since the beginning of harvest, and for some time before.

"22*d*. Still very cool. The waste in reaping increases with its causes, the dryness and broken down state of the wheat.

"23*d*. Strong north wind, and still very cool. Afternoon, rain falling in sight, but merely a light scud here, just before night.

"24*th*. The first moderately warm day, of late.

"25*th*. Finished reaping by night, and the building of shocks very nearly."

This crop yielded enough straw for more than 3000 bushels of grain. The actual product of wheat was 2432 bushels. The quantity of land is 201 acres. The laboring force of the farm was 24 hands of all kinds. Such of the house-servants as could be spared, (about 3,) aided in the labors of harvest. The whole field force was not throughout engaged in the harvest. The shocks were 850 in number, of which about 100, put up wet, were very small.

When threshing the crop, it did not appear that damage had occurred to any of the wheat, after its being put into shocks. This result was better than expected, from the unfavorable weather and condition of the wheat preceding the putting of some of it into shocks.

Harvest of 1848.

[The weather of the spring of 1848 had been good. No important disease or disaster had occurred to my wheat crop, which appeared very good for the land. It proved, indeed, to be a much better product of grain than I supposed during harvest. The crops of wheat generally were better that year than in any other known.]

"*June 7th.* Afternoon—began to reap wheat, with 8 cradles only. The wheat is barely ripe enough [i. e. in the 'dough state'] anywhere; and yet it is so generally near to that state, that I fear most of the crop will be dead-ripe, and wasting, before my small force can half get through the harvest. Strong north wind—and still continues very cool. Reaping equal to work of 1½ days of one man.

"*8th.* From 3 to 6 reapers, at different times, [4½ days work?] Before night, brought the binding up to the reaping. Sheaves shocked up to wheat cut down 8 hours preceding the last reaping. 41 shocks. Wind northerly. This morning, the air seemed cold enough for frost—but none visible. Earth now very dry. Clouds threatening rain—but again clear before night.

"*9th.* Work of 7½ reapers. Day hot, but again cool at night. 40 shocks built. This work now a little more than a day behind the reaping.

"*10th.* Hazy and cloudy. At 10.30 A. M. slow drizzle began. Suspended reaping—and continued putting up shocks until 12 M., and also bound the wheat reaped and left unbound while wet with dew. Both operations hazardous. After a cessation of 3 hours, (during which the weather continued cloudy and damp, but not rainy,) returned to wheat, and shocked all remaining, and which was still quite damp. 174 shocks, mostly small. Those put up before the beginning of the rain were of good size, and some of them larger than usual.*—[8 reapers. 5 days' work of reaping?]

"*Sunday, 11th.* Threatening clouds, but no rain.

"*12th.* 8 reapers. The building of shocks within 2½ hours of the reaping—and desired to be as near as possible. 98 shocks, of large size. Windy, cool, and clear.

"*13th.* Very cool morning, and strong north wind all day. The wheat has ripened rapidly. Though still green in low spots, much the greater proportion is quite ripe, and the straw dry. The heads are beginning to turn downwards. Yet but little more than one-fourth of the wheat land has been reaped. The work gets on slowly. The harvest will be long on hand, even with good weather; and a storm or a spell of rainy weather will cause great loss. 8¼ reapers. 110 shocks put up—and within an hour's work of the reaping.

"*14th.* Strong N. W. wind impeded the reaping, and required the moving to more sheltered ground. 7½ reapers. 95 shocks.

"*15th.* Wind S. W. Very warm. 8 reapers—but two of them young beginners, in place of two good scythemen who are sick to-day. Wheat now dead-ripe—and where longest ripe, the heads bent downward. Began to reap the rankest growth, of which very little is lodged, owing to the very favorable weather. 83 shocks.

"*16th.* 8 reapers. Clear, still, and very warm. Straw now so dry and brittle as to be an impediment to tying the bands. Shattering of grain to-

* None of this wheat, shocked after drizzle, and when damp, or but partially drying afterwards, was found damaged, at threshing-time.

day for first time. 53 shocks. The first hot night (or indeed otherwise than cool) this summer.

"17*th*. Strong S. W. wind. Clouds threatening rain. Have now finished reaping nearly all the wheat or clover-fallow, which includes nearly all of the heavy growth. About half of the land in wheat now reaped. So far, all well secured, but all still to reap is in great peril. 96 shocks. [8 reapers?]

"*Sunday*, 18*th*. Heavy shower. Loose tilled land wet about 2 inches deep. This refreshing to the growing crops, and I hope of not much damage to the wheat. But in its present state, every wetting must do some harm.

"19*th*. Strong southerly wind, impeding the reaping. Four several scuds of rain—which did not stop any of the work, though perhaps the shocking of the damp sheaves may be hazardous. 70 shocks—nearly up to the reaping. 9 reapers. Cool at night.

"20*th*. Nine reapers. 96 shocks. Last night, another hasty shower, which did not prevent binding and shocking this morning. Reaping lightest wheat every morning as long as there remains any effect of dew or dampness on the straw. Afterwards, the reaping moved to thick wheat. Very hot.

"21*st*. 9½ reapers. 79 shocks.

"22*d*. The first calm day for some time—and oppressively hot, even when clouds obscured the sun, as was the case for most of the day. 9 reapers. 77 shocks.

"23*d*. High S. wind. Reaping had to be moved to more sheltered ground. 10 reapers. 63 shocks. Rain threatening. So many heads of wheat now are turned downward, and the straw is so rigid and brittle, that the binding is difficult, and badly done. The topping of the shocks also made bad, by the outspread heads of the wheat in every sheaf, and the rigidness of the straw.

"24*th*. 8½ reapers. 73 shocks. North wind—and at night quite cool.

"*Monday*, 26*th*. Finished reaping at 1.30 P. M. 6 reapers to that time. [4 day's work.] 37 shocks.

"This has been the longest harvest I have ever gone through, but with the best weather ever known throughout harvest. If a heavy rain had occurred, the loss of wheat, from the delay of reaping, would have been very great."

When threshing, all the small shocks put up moist with rain, on the 10th, were found dry, and the wheat in good order. Some other and larger shocks, put up greener, and in dry weather, were mouldy in the middle—though here was no loss of grain.

The crop grew on 256 acres, (as estimated,) and made 5127 bushels. The shocks, 1289, averaged very nearly 4 bushels. The days' work of reaping are estimated at 125½—and the average of quantity of land for each was 2.04 acres; and of grain, 40.8 bushels. The farm hands, of all kinds, were 26, to which were added 5 house-servants—very nearly that whole force being engaged all the time in harvest labors.—*American Farmer*.

REARING NEAT CATTLE.

Mr. D. S. Caldwell, of Essex county, Massachusetts, offers the following judicious remarks on the subject of feeding and weaning calves:

"The most defective branch of farm economy in New England that has come under my observation, is the treatment of calves under the age of four months old. Many stock-growers allow their calves to have all the milk of the dam until six or seven weeks old, (which is frequently all the food they need,) and the young animals eat little or no grass or hay. They are then suddenly weaned, before they have acquired the habit of eating solid food of any kind, and are reduced almost to the point of starving, from which they seldom, if ever, recover."

Mr. Caldwell estimates the cost of rearing a calf till it is three years old, in Essex county, at $26.50; and the animal must be large and in good condition to bring the money. "Ordinary cattle," he remarks, "do not pay for raising, where pasturage is so high as in this vicinity, and most farmers have nearly abandoned the business. To learn calves to eat grass, hay, roots, or meal, at an early age, it is recommended to give them, about half feed in milk, say at the age of three or four weeks, put finely cut roots into their mouths, and hold their mouths till they chew and swallow, or swallow without chewing, the food. In this way, a calf will soon acquire a taste for roots or meal, and eat of its own accord. One eating calf in a pen will soon learn others to do likewise. A calf should have milk till it is ten weeks old, and be gradually weaned. To allow a young animal to suffer from the lack of nutritious food is the worst possible economy, for it will be worth less when three years old, if poorly kept, than at two." By keeping his calves in a thriving condition during the first two years of their lives, Mr. Caldwell sells his two-year old heifers at from $22 to $35. In the spring of 1849, he sold three at the following prices: $30, $32.50, and $35. A three-year old heifer purchased by Mr. C., kept in the ordinary way the first year of her existence, brought only $26. A pair of three-year old steers, which had been used to the yoke two years, and not pampered, were worth $80. Their weight was 3046 pounds. Their extra keep, above ordinary young stock, did not exceed $10; while their labor had been worth $20 the past year. In the opinion of Mr. C., a given amount of food will yield more meat in a Durham than in any other breed of cattle. He says that "they make the best of oxen, but I cannot recommend them for milkers."

Mr. Geo. W. Drisko, of Washington county, Maine, says that upwards of 14,000 cattle were received at Cambridge market, Mass., from the western and central counties of Maine, during the year ending November 1st, 1850. This business has sprung up since the construction of the railroad from Boston into Maine, and it is likely to increase. There are many districts in which it will pay well to rear superior milkers, beef-cattle, and working-oxen; where the growing of ordinary stock is a losing business. Every close observer, who has paid attention to this subject, must know that the necessary cost of breeding fine animals and bringing them to maturity, does not exceed that of producing indifferent ones of equal weight; and yet, a good cow sells readily at three times the price of a poor one, and then yields a better profit to the purchaser than the latter. Beef-cattle, which furnish the butcher little besides heads and horns, legs and viscera, although a vast

quantity of food was consumed to form this mass of offal, are dear at any price. Farmers have too long and too generally neglected the art of breeding and keeping domestic animals. This branch of rural industry affords little profit to a majority of agriculturists, simply because it is not properly attended to. In Belgium, it is the general practice to market beef-cattle at two years of age—experience having taught the important truth that young growing animals give a larger return in meat for any given amount of food than adults can possibly yield. A steer, which is 1000 days old, should have a live weight of 1500 pounds. In rearing calves from dairy-cows, they should be fed on buttermilk and skim-milk sweetened with molasses. This saccharine substance is the best substitute for the butter taken from their mother's milk. A small quantity of molasses will answer the purposes of the animal economy. A gruel, made by boiling a little corn, oat, or barley-meal, is excellent feed for calves, and will pay a round profit, if the animals are worth raising. Pea and bean porridge are admirably adapted to promote the growth of calves. In England, it is a common practice to rear two calves on a single cow; a plan that is adopted by many in this country. At the South and West, calves and cows herd together, and, with care and good keep, fine stock may grow in this way. But the misfortune is, where cattle can be reared at so little expense, they receive scarcely any attention; and by propagating from inferior animals of both sexes, the herd soon degenerates. Cattle that have to pick up a precarious living the year round where they can find it, always deteriorate. By regular feeding 365 days in a year, or securing good keep and care, as to salt, water, shelter, and propagation, one's stock may be constantly improving. Too little pains are taken to provide fresh pastures for neat stock, horses, and mules, and in making good winter forage. Considered as a whole, three-fourths of the meadows in the United States are suffering a gradual exhaustion of the elements which form timothy, herds-grass, blue-grass, and clover. Not one farmer in ten thousand keeps an exact account of debit and credit in reference to the bone-earth and potash taken from any field in hay and grass, and restored to it in manure of any kind. If such an account were kept, the book would show that the soil parts with vastly more alkalies and other elements of crops, than it receives. Neat cattle should be so managed as to make this account balance.

Mr. Moses Coburn, of Whitewater, Walworth county, Wisconsin, says that the cost of rearing steers until they are three years old, in that region, is about $8 each; at which age a pair of well-matched steers command $40. The usual price of good dairy-cows in the fall is about $15; in the spring, they sell at $20.

Mr. James D. Bell, of Walden, Vermont, who is in latitude 44½° north, on the Green Mountains, says that the cost of rearing neat cattle till three years old, is $15; at which age the usual price is $20. Cows are worth from $25 to $35 in the spring, and in the fall from $15 to $20. "Our farmers grow but few sheep or hogs. Some first-rate horses are reared. A dairy-cow yields, on an average, 150 pounds of butter a year, which is worth 17 cents a pound. The culture of turnips, carrots, and beets is increasing. Potatoes were rotted somewhat in 1850; common yield, 150 bushels per acre: 500 have been grown in this town. Agricultural interest slowly but *surely* advancing."

Mr. Joseph W. Dudley, of Madison, Connecticut, says that it costs about $20 to rear a calf till it becomes three years old, and a steer at that age is

worth $25. Value of good cows in the spring is from $35 to $40; in the fall, $25 to $30. Cows yield, on an average, 150 pounds butter per annum; cost of production 16 cents; average price, "one Yankee shilling."

Mr. C. A. Spalding, of Windham county, Connecticut, estimates the expense of rearing cattle till three years old, at $30; which are worth $30 to $35. Good cows sell in the spring at from $30 to $35; in the fall, $12 less. Feed is often poor, and cows average only 100 pounds of cheese. and 40 of butter; the former being made in warm, and the latter in cool weather. Mr. Daniel W. Alford, of Hartford, Connecticut, writes that cows yield 200 pounds of butter in a year; of cheese, the same quantity. Cost of producing butter, 12 cents; that of cheese not stated. Cost of rearing neat cattle till three years old, $18 a head; price from $20 to $30. Mr. R. P. Stevens, of Cerestown, Pennsylvania, estimates the expense of rearing neat stock until three years of age, at $20; and says that the average price at that age is $30. This indicates a good business in McKean county, which is well adapted to grazing. He remarks "that it is generally conceded that a given quantity of food will yield more meat in a Durham, or Devon, than in common stock, or our native breed." Mr. Prescott Cutting, of Worcester county, Massachusetts, writes that "considerable attention is paid in this section to the rearing of stock: our heifers for the dairy; steers for the yoke; and both, ultimately, for the shambles. Breeds, natives pretty well crossed with Durhams, and lately with Devons. I have no doubt that a given amount of feed will produce more beef in a Durham than in a native." "Cost of rearing till three years old, I should say, at least $25, and they usually bring about that price, (heifers,) and steers a little more. System of rearing, is to let the calf suck till 10 or 12 weeks old, then put them in good feed. It is bad economy to stint a calf during the early part of its life, for he seldom, if ever, recovers from the injury. Pains are taken to raise good milkers from our best cows." Our correspondent urges the importance of selecting a male from a family of superior milkers, instead of looking so particularly to his size and form, regardless of maternity. By careful selections of both sexes for a few generations, a distinct family may be formed, which, with care and good management as dairy-cows, will be much improved from the original stock.

Mr. Joseph Sibley, of West Rush, Monroe county, New York, says, "On no subject connected with agriculture is there so great a difference of opinion as on that of stock. With some, every thing that is *new* is the best. To be far-fetched and dear-bought establishes a reputation, regardless of all defects. I am of the opinion that farmers often deceive themselves; when they get an animal of a new breed, they give it altogether better keeping than their old breeds receive, and such usage renders the new better-looking and more productive: the new breed is credited with advantages which are really due to increased care and feeding. My own opinion is, that if as much pains had been taken with our native cattle as has been bestowed on the imported races for the last 20 years, the former would by this time be quite equal to the latter. The cattle generally imported into this country are from stock bred in England for the shambles, and for show, rather than profit. These races have been kept so high and so extravagantly fed, that high-keeping has become constitutional, and their offspring must be pampered, or they fall below our more hardy native

stock; and this result is witnessed where both are kept together, summer and winter, on something less than full feed."

Mr. Sibley says that apples are grown to feed hogs and cattle to a considerable extent, and that good eating-apples are a profitable market-crop. His communication bears date February 21st, 1851, and after this report is mainly completed. At that time, he had apples which weighed 24 ounces.

Mr. Lewis T. Hoyt, of Danbury, Connecticut, says that the average yearly produce of butter, per cow, is not less than 200 pounds; which is worth from 18 to 20 cents a pound. Good dairy-cows sell at from $30 to $40 in spring, and from $20 to $30 in fall.

In some remarks on the cost of rearing neat cattle, Mr. George Boyer, of Schuylkill county, Pennsylvania, advises agriculturists to raise colts instead of neat stock. He says that he has had 30 years experience in the business, and finds no difference in the expense of rearing a colt or steer, till three years old. At the age named, a colt will sell for $75 or $80; and a steer at less than a third of the money. Good blooded colts bring readily $100 apiece, when three years old; and sometimes $200 or $300. He adds, "I have paid more than the sums named for colts, and think the production of horses far more profitable to the farmer than to raise cattle."

Colonel B. F. Bridgeman, of Bledsoe county, Tennessee, writes that the cost of rearing heifers and steers until three years old is $7.50; and ten dollars is the price at which they are sold. Good dairy-cows are worth from $10 to $12. He says that 100 pounds of corn will produce from 10 to 12 pounds of beef; and that Durham cattle will yield more good beef from a given amount of feed than natives. In seeding for meadows or pastures, Colonel B. uses 2 gallons re'-top, 3 gallons timothy, and 1½ to 2 gallons clover-seed per acre. This is a g od mixture. He estimates the cost of growing hay at $6 per ton, which m ost farmers at the North will regard as high.

Mr. Turner Vaughan, of Wilson county, in the same State, writes that "the cost of rearing neat cattle until 3 years, is as follows: 1st year, $1; 2d year, $2; 3d year, $3. On my little farm, this can be and is done, and pays tolerably fair wages. A short time since, I sold 35 head, at the above-named age, for $181, and did very well." One hundred and eighty-one dollars, divided by 35, gives only a small fraction over $5.17 a head for three-year old steers; which shows how cheaply neat stock is grown in Wilson county. Mr. V. remarks: "I am pretty well fixed for this kind of work; my yearlings fodder themselves after this wise: I put ricks or stacks of hay on platforms 18 inches high, made of logs or fence-rails, in each of which are two tons of hay—if hay it may be called, being composed of millet, wheat, and oat-straw. My weaned calves stand around these stacks all winter, and eat as they like. When the weather is very hard, I give them coarse cornmeal, in little troughs, manufactured (ground) at a chunck of a horse-mill hard by, which serves as a shelter during winter. My mode of raising cattle is my own; and in it I find remarkable safety from disease—not losing 2 per cent. The great secrets are, good shelter in winter and high salting in summer. I buy my calves at $1.50 a head; so you see my grass and hay fed beef costs me less than 2 cents a pound, and my stall-fed less than 3½ cents. Good dairy-cows are worth $15. A given amount of food will produce more beef in a Durham, Devon, or Hereford, than in any indigenous or native animal. I deem it wrong to cut the ears of stock: keeping them inside of fences is better. My plan of castration (if it is mine) is m ost successful for all kinds of stock: I draw the testicle

a few inches from the groin, clamp the spermatic chord with two sticks tied at one end, and cut it off close to the clamp; pour on a spoonful of tar, grease, and salt, kept warm; then sear the chord well, and take all off. The emasculated animals should be kept out of the rain till well; and in this way I lose *none*. I change bulls every two years. Beef is worth from 2 to 4 cents; green hides, 5 cents; dry, 10; tallow, 6 to 8. I keep my yearlings, milch-cows, and other neat stock, in separate fields in summer, and apartments in winter; and warm and comfortable in cold weather, as far as practicable. This division of *caste* and *size* prevents the strong from robbing the weak, and, by carefully sawing off the tip of the horn, no mischief is done."

THE PREPARATION AND USE OF MANURES.

BY DANIEL LEE, M. D.

All manures, from whatever source derived, should be regarded as part and parcel of the soil, and studied in that connection. It is usual to consider them under the heads of animal, vegetable, and mineral manures. Animal manures are either animal substances, like the flesh of a dead horse or sheep, or the excrements of animals, voided by the bowels and kidneys. Vegetable manures differ from the dung and urine of herbivorous animals in being less concentrated, and containing in a given weight more carbon (coal) and more of the elements of water, (oxygen and hydrogen.) Decaying vegetables, not consumed by animals, yield vegetable manures. Mineral manures differ from both animal and vegetable in being in a wholly disorganized state, like gypsum, burnt bones, wood-ashes, ammonia, and carbonic acid. Of all animal manures, the excrements of dunghill fowls and sea-birds, called guano, approximate nearest to those which are minerals, or in a disorganized condition. Comparatively speaking, guano contains very little carbon and oxygen, and a large percentage of nitrogen and phosphorus.

In no department of rural economy is American labor more unskilfully expended than in the collection and use of manures. This arises partly from the low price of crops, which discourages the critical study of fertilizers, and partly from the lack of good schools and experimental farms for teaching such labor-saving processes as may be best adapted to the peculiar circumstances of the cultivators of the soil in the several States. Different crops, prices, soils, climates, and variations in value and kind of farm labor, all modify practice, and render the effort to lay down general rules in manure-making exceedingly difficult and hazardous. We shall venture, however, to indicate two or three plans for collecting and applying manures, which experience has shown to be highly advantageous.

In all cases where it can conveniently be done, domestic animals should be fed under a shelter of some kind, to protect them from the sun and rains of summer, and the cold and storms of winter. In this way, their droppings may easily be gathered into heaps, keeping the dung and urine together, and both from loss by volatilization, and protecting the mass from the washings of rain or snow water, and natural drainage. Where manure has to

be hauled any considerable distance, it is bad policy to add weight to it by applying water with the view to promote fermentation or the rotting of the heap. Suppose one has ten tons of dry straw or cornstalks, it will not pay to add, as is often done, forty tons of rain-water, so that the farmer actually hauls four tons of simple water into his distant fields to convey thither one ton of vegetable matter. If one's soil is so dry that straw and cornstalks will not readily decay when ploughed in, sound economy dictates the making of all compost-heaps in the fields where the manure is to be used. This will save the hauling of an immense quantity of water; for every ingredient used in making the compost may go into the field in a dry state. Leached or dripped ashes should be well dried to diminish their weight before hauling; the same remark will apply to swamp-muck or mud, to forest-leaves, straw, and trash of every kind. Rains are expected to supply the necessary amount of water; although it will often pay to dig wells in fields to have water for this purpose and for stock in all coming time. A large reservoir, deep in the ground, and made tight by water-lime cement or good clay, to hold surface-water in case living water is not readily attainable, will pay a good interest on its cost. The excrements of domestic animals, particularly their urine, will hasten the decomposition of coarse straw, stalks, and muck; but it is better to haul the dung and urine of domestic animals to distant compost-heaps than so many tons of valueless water. Without the admixture of the excreta of animals, all vegetable substances placed in the compost-heap will rot, and stable-manure may be more economically applied directly to the land that needs it. As a general rule, the sooner a plant designed to fertilize the soil is buried in it, the better. It can never yield a larger quantity of carbon, hydrogen, nitrogen, oxygen, or earthy salts, by passing through the digestive organs of any animal, or by lying a day or a year in a manure or compost-heap. In case one has poor land, and desires to produce a large crop in a few weeks or months, as in market-gardening, then the previous rotting of manure or vegetable substances is indispensable to feed many growing plants up to the highest point of vegetable nutrition. But on fair soils, in common field culture, this great labor of preparing food for crops is unwise husbandry. Let the entire decomposition take place in the soil, as is witnessed when clover, peas, or other plants are turned under with the plough. If it was convenient, all the droppings of animals should be immediately covered in the soils which most lack fertility; for they will lose more than they can gain by keeping above-ground. But so speedy and constant an application of manures would interfere with other necessary labors on the farm, and hence the safe-keeping of fertilizers until needed is a matter of importance. It is excellent economy to provide a bed of dry straw, forest-leaves, or peat, to absorb all the urine of domestic animals. In what is called "box-feeding," both the dung and urine of fatting oxen, sheep, and hogs are intimately mixed with straw, or some other good absorbent, and trodden under the feet of the animals. As the latter consume meal and roots, their excreta are obviously rich in the elements of fertility. The animal is turned loose in a small pen or box, being fed regularly and well supplied with litter for bedding. The mass of manure thus formed is rarely disturbed until it is applied to the ground, either as a top-dressing or to be mingled with tilled earth. As a general rule, it is desirable to cover manure with from three to nine inches of soil. If it is light, porous, and sandy, manure should be buried deep; if compact and impervious, a covering of two or three inches will suffice to

retain all gaseous elements. Manure moves both downward and upward, as well as laterally, in tilled ground, and therefore on a medium soil it should be placed midway in the earth stirred with the plough. If the ground is broken ten inches deep, five inches of the soil should lie above the manure, and five below it.

All organic and mineral fertilizers dissolved in water will enter so far into a chemical combination with the soil when applied to it in irrigation, that nothing will be lost by atmospheric and solar influences, unless the quantity applied per square rod is needlessly large. This speedy and thorough incorporation of fertilizing substances with the soil when dissolved, has led many to attempt the complete solution of manure before it is applied to the land, knowing that it cannot enter the roots of plants to nourish them before it is dissolved in water, or reduced to a gaseous state. By bringing all fertilizers made in stables and yards into a liquid form, the manure is easily conveyed in wooden pump-logs or pipes made of burnt clay into the several fields on the farm. If the fields are lower than the barn or stable, the water will run to them in pipes by its own gravity; and if higher, horse-power or a small steam-engine will force the liquid up to their level. Operations of this kind are successfully practised in England. Hose is used to distribute the water over the surface in the fields; and thus they are both manured and irrigated at such times as the applications will do the most good.

REMARKS ON DAIRY COWS, &c.

BY H. S. JOHNSON, CANTON, N. Y.

Every dairyman should raise his own cows. In purchasing, it is not always easy to obtain cows of the best quality, and, where such can be bought, the outlay is so considerable, that, as a general rule, it is not advisable for the farmer to incur the expense. It will be more economical to wait two or three years, in which time he can raise them. The farmer will not feel the expense of raising ten, fifteen, or twenty cows from calves as he will the outlay of buying that number. Add to this, he is more sure to raise good cows than he is to get them by purchase. Heifers well kept will generally come in the spring when they are two years old, and three such heifers will make as much butter or cheese the first season, and give milk, as two full-grown cows of the same quality.

Cows of a good constitution and well kept will improve till they are eight years old, and many will grow better for butter and cheese till they are ten or even twelve years old. Good healthy cows do not ordinarily diminish their dairy qualities till they pass their fourteenth year. I have kept some cows till they were sixteen and even eighteen years old, without perceiving any falling off of their good dairy properties. From my experience, it is safe to keep good healthy cows in the dairy one milking season after they are fourteen years old.

I have a small dairy of twenty-two cows, all of which I raised from calves. Most of these gave milk at two years old. I do not allow my cows to go

dry more than from six to eight weeks. December 20th:—We are now, in my family, making butter of the first quality for the table. Winter has been severe during the last four weeks: the cows are fed nothing but good hay. We milk every day at noon: at this time of the day we think we get more milk than we should at either night or morning, or at both night and morning. The milk is put into a common tin milk-strainer, then the strainer set into a vessel of boiling water over the fire, and allowed to heat till the milk is nearly scalded, when it is strained into pans and set in a warm stove-room for the cream to rise. About the second day, the cream is taken off, warmed to sixty-two degrees, and churned. It then churns in from ten to fifteen minutes, and the butter is good, rich, and yellow. By this means we make about half the amount of butter after winter has fairly set in that we do from the same cows in the months of September and October. My experience is, that, by this management, cows are quite as good for the dairy the following summer as though they had gone dry three or even four months.

As far as my information extends, it is a common practice with dairymen to kill their calves at about seven days old. The practice deserves and should receive reprehension: it tends to prevent all improvement in cattle, and it yields no profit to its abettors. My practice is to select for raising all my early well-formed calves. These are allowed to suck from three days to a week, when they are taken away from the cow and fed with skim-milk. When they are about one month old, we put into each mess for a calf about one gill of shorts or oatmeal, increasing the quantity, as the calf grows older, to half a pint for each mess. When such a number of cows come in that we think it desirable to make cheese, we commence cheese making, and feed the calves with whey and shorts or oatmeal, instead of skim-milk; taking care to have the calves in plenty of good fresh grass for feed. The late calves we let suck all the milk of the cow till they are from four to five weeks old, when they are sold for veal. When I do not wish to keep my calves after they are weaned, which takes place when they are three months old, there is always a cash market for them of more than the cost to raise them to that period. By pursuing this course, the amount of our butter and cheese is not perceptibly diminished, and we are raising the best to take the place of such cows as require to be turned off for beef, and the means also are used to secure the most desirable improvement in cattle.

In selecting individuals for breeders to improve dairy-cows, horned cattle, and, indeed, other domestic animals, the farmer should not be governed by any one breed. The excellence of the animal should decide its claim to consideration. That animal should be selected which is the nearest to perfection.

The efforts to bring into notice particular breeds of imported animals is doing much good to the agricultural interest, and great praise is due to those worthy men who have embarked in the enterprise. They should be encouraged to continue their philanthropic exertions. But then for every farmer there is something practical about this business. His interest is to select for breeding the most excellent animals, irrespective of every other claim. Perhaps it is not temerity to suppose that, as a people, there is a kind of propensity among us to follow some fashionable course in the selection of our breeds of domestic animals. Hence the introduction of a popular breed is often attended by a prevailing mania of greater or less intensity, according to the prices paid for these new animals. In the hurry which takes

place to obtain the favorite breed first, trifling and accidental tests of excellence are established, and it would be difficult to decide whether the produced progeny owe their celebrity to the enthusiasm or empiricism of buyers and sellers. Trifling distinctive marks may, to a certain extent, present indicia of a breed or variety; but the shadow should not, as is too often the case, be mistaken for the substance. An animal may possess the slight peculiarities of a breed, without any of its excellences. In forming an estimate of the qualities of an individual, the marks of resemblance should not be regarded to the exclusion of excellences. Even pedigrees, without excellence, are of little value; and when they are puffed about, appended with lofty-sounding names, to give celebrity to inferiority, they are ridiculous.

Such are some of the leading considerations which should influence the discreet farmer to make his experiments with known and established traits of real worth. I take the liberty to offer a suggestion for the consideration of those desirous to improve dairy-cows. There is a breed of cattle, which have long been known in England and Scotland for the richness of their milk and the valuable flavour which it imparts to cheese. These properties are so well known, that many of the most eminent dairymen keep a few of them for this specific object. They are a small, hardy breed, with few properties to recommend them for beef or market, except that they are easy to keep, even thriving where other cattle would starve. Some of them have been imported into this country; but, so far as I am informed, they have not met with great favor, on account of being small. The prevailing taste is for large cattle. It will be understood that I allude to the breed called Alderney cattle. Now, would not a cross of these Alderneys with such stock as we have, be likely to be an improvement for dairy-cows? Did I know where to obtain a pure-blooded sire, I would try the experiment.

MANURE.

The subject of manure is one of unlimited importance to every farmer. There was a time when the fancied elixir of life drew the arrested attention of the nations. Its supposed value was all-engrossing. Happily for the world, the dark shades of that night of ignorance have retired. But still subjects that are perceived to be of high importance engross the minds and become the chosen hobbies of men. Not unfrequently the élite and the savans enter the arena and contend for the prize. The efforts to discover hidden truths or bring to light occult science not unfrequently exert an influence which conducts unthinking and bewildered men so far astray, that they either neglect their own interest, or else pursue it with such inappropriate means as are sure to defeat their most assiduous efforts.

But what bearing have these remarks on the humble subject of manure for the farm? Reflect, and you will perceive that they are not altogether inappropriate. By at least common consent, the subject of manure is admitted to be the foundation of agricultural prosperity. This is the true state of the case in both Europe and America. The admitted importance of manure to successful farming is so great, that the most laborious investigations of science are directed to it. Men deservedly in the highest ranks of talent and literature are bestowing upon it their untiring labors. On this subject, several of the most learned men that ever enlightened and adorned any age or country are gathering their most unfading laurels. In our own land, many of the first scholars of the age are awakened and electrified by

the commanding importance of this rustic subject. So far, all is well. Noble minds, men of undying fame, are in this particular giving their labors to a subject every way worthy of their regard. To increase the comforts and multiply the food for a world is no trifling concern.

This class of scientific men are exerting a wide influence—an influence that affects every agricultural society and every agricultural paper. Though their labors have developed many important truths and disclosed much valuable information, yet they have but just entered the wide field which opens before them, and much that they have communicated is theory, and not fact. Experiments, testing the true value of different kinds of manure, have as yet been very imperfect and unsatisfactory. After all that has been obtained, our knowledge on this subject is still in its infancy. There is some reason to apprehend that agriculturists may be so infatuated by the many theories as idly to seek after some substance for manure, as men formerly sought the philosopher's stone, or else, amid perplexity, to conclude that all is fancy, and leave their fields to barrenness and decay.

The farmer should be very cautious in regard to what some have been pleased to denominate special manure, and others, concentrated manure. This consists in burning the materials and using the ashes to enrich the land. No doubt such ashes, or any ashes judiciously employed, are a good fertilizer. But is there not a loss in the process of burning? Every man, who has been at all conversant with clearing new land, knows that, in a very dry time, there is danger of burning such land too much. When all the vegetable matter is consumed by the fire in clearing, there may be one fair crop after it, but the land will be rendered barren and subject to moss for a long term of years. The prairies of the West are rendered productive by partially burning the vegetable surface. But burn deep, consume all the accumulation of vegetables, and barrenness will succeed. Men of experience in clearing land are cautious about burning deep even green-timbered lands. If the farmer wishes to increase the efficiency of his manure, let him haul marl, clay, and leached ashes on his sandy land, but let him by no means burn his manure-heap, nor suffer it to become dry by fermenting.

To the farmer it is important that the investigations of agricultural chemistry should proceed. The farmer should wait patiently for the result of those labors, and, as fast as facts are established, he should profit by them. In the mean time, he should be diligent in using the means which all experience, since the earth began to be cultivated, proves will enrich his fields and increase the reward of his toil. Notwithstanding all that has been written on agricultural chemistry by the venerated names of Sir Humphrey Davy, Lampadius, Goeppert, Sprengel, Liebig, Fresenius, Boussingault, and numerous other worthies in both Europe and America, still it is clear that one of the best substances to enrich the land and increase the crop,—one upon which every farmer may rely with unwavering safety, is barn-yard manure. As a farmer, here lies his pearl of great price—here his mine of gold. Nor does he need another Solomon to instruct him how to use it. All that is needed is care and effort to accumulate it, discretion in preserving it, a liberal hand and common sense to spread it on his fields.

Twenty-five head of cattle will, in this climate, with proper care, make one hundred cords of manure during the foddering season. This, spread on eight acres, will cause each acre to yield fifty bushels of corn—that is, on land, which, without manure, would not produce more than twenty or twenty-five bushels to the acre. Thus there would be a clear gain of two hundred

bushels of corn the first year, with no additional expense, only that of putting the manure on the land. The second year, the same manure would equally benefit a wheat-crop or some other grain. Nor would the manure then be exhausted. The land would still be in a good condition for grass or clover. Where corn is worth fifty cents the bushel, the farmer may with safety estimate each cord of his barn-yard manure worth to him at least two dollars in cash, besides keeping his farm in a productive state. The farmer who saves his manure with care and applies it with common sense will steer his course with safety, and not be lost on a barren waste. But neglect manure, and no part of the world can continue fertile under the exhausting process of agriculture. If, without manure, the father obtains good crops, he will surely leave desolation and poverty to his sons. Here is a case where the iniquity of the fathers is visited upon the children.

It then becomes a matter of no small interest to inquire what are some of the means well adapted to accumulate and preserve manure. The farmer should stable all his cattle during the foddering season. His stables should all be prepared with tanks or vats under them, to receive all the liquid secretions from his cattle. Into these vats should be thrown, in the fall, a quantity of some suitable substance to absorb and retain the liquids. This putting into the vats some absorbent should be repeated two or more times during the winter. He should also have a good yard connected with his stables, in which his cattle may run in the daytime, when out of the stables. His yard should be covered to the depth of six inches or more, in the fall, with swamp-muck, with leaves from the forest, with any turf from the highway or from his headlands. By lying in his yard during the winter, and being mixed with the droppings of his cattle, any of these substances will be as good in the spring as common barn-yard manure. All the coarse remains of the fodder, which the stock refuse to eat, should be thrown into the tanks under the stables; the manure from the stables should be thrown into heaps, and sheltered from the rains and snows, to preserve it from leaching; all the weeds on the farm, of every kind, should be collected while green, and piled in the yard for manure. The farmer's hogs should be kept at work making manure. Their pen should be so constructed that there will be a hog-laboratory in one part of it. In this apartment should often be placed swamp-muck, turf, or straw, all of which the hogs will manufacture into first rate manure during the season. They will work diligently if occasionally encouraged with a little corn and other grain sprinkled over their task, and provided they have a clean, dry place to which they can retire for rest after hard fatigue. Each hog will produce at least one cord of manure in the course of the summer. The privy, also, should be constructed with a bin or portable box under the seat, with handles, so that two men can remove it, as occasion may require, and empty it on the manure heap. This box should be supplied with some absorbent material, and often be the recipient of a liberal supply of gypsum. Every animal that pertains to the farmer should assist in accumulating manure—the family, cattle, hogs and all. A well-regulated method of doing this will essentially contribute to the comfort and health of all, as well as secure the thrift of the farmer.

In the spring, every place that contains manure should be cleared of its contents for the benefit of the field. Farmers, who cautiously secure all the manure they can, use it discreetly, and exercise becoming economy, with the ordinary blessings of Him who rewards the diligent hand, will soon be able to live in palaces, become money-lenders, and enjoy the appellation of

the nobility of America—not made noblemen by the ever-wavering breath of monarchy, but constituted *the nobility* by their skill with the plough and their success in producing bread for the hungry.

ROTATION OF CROPS.

A proper rotation of crops is very difficult to obtain, and of high importance to the farmer. A rotation adapted to one section may be entirely injudicious for another. It should be particularly adapted to the place where it is employed, so as to suit the soil, the climate, and the market. As these will vary in different localities, the farmer should exercise his judgment in arranging the rotation so as to secure the best means of enriching the farm, and take that course which will yield the most profitable returns for his labor. To obtain these results, the first principles upon which rotations are based should be brought into the account.

One principle never to be overlooked is, that every plant exhausts certain constituents of the soil on which it grows. Every plant obtains a part of its support from the soil and a part from the atmosphere; and hence every crop diminishes the fertility of the soil where the plant is removed from the field. But if allowed to remain on the soil they enrich it, for all that they abstract from the soil, with all they draw from the atmosphere, is given back again; and hence the noted fertility of lands on which the accumulated succession of vegetables have decayed during many years. But on the farm, the crop is generally removed, and hence the necessity of making a return by manuring, to prevent sterility. By constantly cropping, the most fertile fields will become unproductive and barren. In this way, most lands become unprofitable in a few years. Several of the most fertile sections of the State of New York have, in this way, been so far exhausted as not to yield a remunerating crop. Again: Different plants do not take from the soil the same elements; and hence a succession of the same crop must soon deprive the soil of certain parts which are essential to its growth, and it must languish, while some other crop, requiring different food, would flourish luxuriantly.

Nor should the farmer overlook the fact that some plants favor the growth of certain kinds of weeds more than others; chess and cockle flourish with wheat. Weeds peculiar to a particular crop multiply greatly when that crop is raised on the same land for many successive years. The same is also true in regard to certain kinds of destructive insects. The Hessian-fly and the weevil pursue the wheat-crop. The wireworm and the grub make their choice among the crops of the farmer, and multiply rapidly with a succession of what they have chosen.

Every farmer knows that some crops admit of a heavier application of manure than others. Broad-leaved succulent plants admit of abundance of manure. Corn, beets, and turnips are of this class; likewise grass for meadows and pasture, with most plants whose value depends mainly on the quantity of green growth. But the crops of smaller grain, such as barley, wheat and rye, may be so heavily manured as to cause a too luxuriant growth of straw at the expense of the grain. For this reason, in a rotation, the manure should be applied to such as are immediately benefited by a larger application. Corn and oats will derive more benefit from manure less decayed than wheat requires. A field heavily manured in the spring with manure made in the barn-yard during the winter, will produce

a larger crop of corn or oats, and the next season yield as large a crop of spring wheat as it would had the manure been piled in the yard through one summer and then been spread on the field for wheat. The manure should always be put on the field as soon as may be after breaking up the sward, that it may be thoroughly spread and mixed with the soil. This item is of no little importance, for, by leaving fresh manure in bunches, unmixed with the soil, it yields little benefit to the plants, and, by increasing the drought, it has diminished instead of increasing the crop.

Farming, wisely conducted, is a continued succession of exhaustion and replenishing. The best method of replenishing the land should, in all rotations, be regarded as the leading object. The crop which brings the most money is not always the best. Not a few look only to immediate profit, and their management of the soil perfectly harmonizes with this one idea. Future fertility is disregarded; every thing possible is taken from the field and nothing returned to it—nothing done to restore its wasted energies—nothing to check the progress of exhaustion. If the farm, when new, was rich and fertile, it soon becomes barren and sterile, and the misguided occupant is ready to abandon the desolation which his improvidence has spread around him, and seek more fertile lands in a new country.

That these evils may all be avoided is certain, if a rotation of cropping can be secured, which shall afford a sufficient change in the draft made by the plants on the different elements of fertility in the soil, and which shall return to the soil as great a proportion of organic matter in manure as is taken from it. Of late years, it has been proved by many skilful farmers, that by the application of manures produced on the farm only, there has been a constant increase of fertility.

In forming a rotation, a number of particulars should be carefully considered:—1. To exhaust the soil the least that can be done. 2. Restore back to the soil as much manure as practicable. 3. Take that course which will best prepare the field for a future crop. 4. Prevent, as far as possible, the growth of weeds and the increase of insects. 5. Adapt the application of manure to the respective requirements of the different crops which are to follow. 6. Select the several crops so as to adapt them to soil, climate, and market.

For a three years course, the following is found to do well:—First year—Corn, well manured. Second year—Wheat. Third year—Clover.

This rotation brings round a return of the same crop so frequently that there will be danger of exhausting instead of increasing the fertility of the soil. A more extended rotation, like the following, would be preferable:—First year—Corn, oats, and roots, with plenty of manure. Second year—Barley, or peas, or both. Third year—Wheat. Fourth year—Clover, from two to three years.

It is needless to furnish specific examples of rotation. The principles above laid down will enable the cultivator to vary the crops for rotation as circumstances require. The more the subject is examined, the more deeply interesting will its investigation and application appear. A rotation, the same as given above, has tripled the products of many farms; and some, which were exhausted and abandoned, it has restored to fertility rivalling the rich districts of virgin soil. Let the farmer carefully examine the subject of rotation, exercise his judgment in its practical application, and he will guide his operations with precision and with increased profit.

That the farms will not now produce such abundant crops of wheat as

they were accustomed to yield, has of late become the common complaint of agriculturists in the Northern and Eastern States. This complaint is well-founded—it is the language of fact. While the great mass consider this fact mysterious and inexplicable, it is one of the most obvious things in the world. It is the natural result of the negligent method of farming that has done it. The fields have been cropped without being replenished, till they are exhausted. There is no more propriety in this complaint than there would be in the case of the man who should complain that his team would not work while he neglected to feed them. Feed the team properly and fully, and it will work. Feed the field and subject it to a judicious rotation, and it will produce more than its former abundance. The same field may be constantly cropped, and yet constantly enriched with the refuse of its own productions. Let farmers perform their part faithfully, and there would be no worn-out lands as long as the world stands.

A PLEA FOR AGRICULTURE.

The most splendid superstructure has its foundation either on the earth or beneath its surface. Though what is high, magnificent, and imposing may engross the whole attention and monopolize the entire thoughts, yet it is the humble foundation which sustains the mighty edifice. So all the splendor and glory of these United States, which extort the admiration of the old world and constitute this the most desirable of all lands, are sustained by humble agriculture. There was once a city delivered from the invading forces of a powerful king by a poor wise man, and yet no one, we are told in the sequel, thought of that poor wise man, but forgot him. Is it not something so with our government in regard to agriculture? Very little, even next to nothing, is done for this prime essential interest. The accumulated millions of our national revenue are mostly expended for the benefit and protection of commerce, and by that means almost directly to advance the manufacturing interest, while only a few hundred dollars, through the instrumentality of the Patent Office, are doled out as a pittance, or perhaps a peace-offering, to agriculture.

Now it may be asked in soberness, is this course wise? Is it the dictate of impartial justice? Is it *republican* thus to neglect that interest which sustains all others?

Will not candor give a negative response to each and to all these interrogatories? The vast extent and exigencies of our country will constitute agriculture the greatest interest of the United States, until all our vacant lands are brought into cultivation and made to enrich and feed the teeming millions who must eventually have their homes here, until every frontier section is occupied by a dense population, who will make these waste lands yield wealth to the nation, and be able to defend the borders in case of an invasion. Nor can a town, city, or village be built up and sustained otherwise than as rustic farmers become pioneers to provide them food. Neither does it require the eyes of an Argus to perceive that by the neglect of agriculture our country has already sustained some serious detriment. Under governmental neglect, agriculture has either sunk or remained in disrepute. While commerce has been the chief pet of the government, it has, with all its appendages, been regarded as replete with honor. As a consequence, a vast number of our young men, possessing talent and enterprise, have turned from the disrepute of agriculture and resorted to mer-

cantile employment. That department has been overcrowded, and thousands, after a few years spent in that pursuit, have failed, and become the most pitiable and most helpless of paupers. How much better would it have been for the country, for these men and their descendants, had they been contented to till the ground! While agriculture has been treated as a detected impostor and loaded with obloquy, the exclusive patronage of the government upon commerce has operated as a lure to draw numerous thousands of young men of fine promise upon the fatal rock. Nor does this make up all the dimensions of the evil. One of the most useful and honorable of the learned professions stands intimately connected with commerce and the mercantile pursuit. As a consequence, that profession has been crowded to overflowing, and not a little out of repute. Thus, the evil of which we complain has, indirectly at least, blotted out and destroyed no small amount of the rising talent and promise of our country.

Nor is this neglect of agriculture in accordance with impartial justice. Our naval force has, with great propriety, been called the right arm of the nation. Agriculture nerves that arm and makes it strong: take away this aid, and that arm would become palsied and powerless. Not only so, but the agricultural class, more than any other, must defend our country, in case of an insurrection or invasion. Still further, in the State of New York, which is, probably, about a fair specimen of the other States, the agricultural interest pays near four-fifths of the taxes, and, of course, about that proportion indirectly towards the United States revenue. Is it republican thus to tax this interest, and then cast it off by neglect? Why should not the farming interest be allowed a bureau at the seat of government—an organ by which they might communicate with the councils of the nation, as their exigencies might demand? Might not a pittance of the nation's treasure be appropriated to establish and carry on an experimental farm in different States, where experiments, which exceed the means of nearly all the farmers, might be made with agriculture and with animals? The farmer, the manufacturer, and the merchant are allies, and should be treated as such by the government, without partiality. These unitedly have rendered our country independent by its own resources, and safe against foreign foes. All America is united in the bonds of internal commerce. Our exchanges at home exceed our foreign traffic. Were our ships driven from the ocean-highways of the world, our country has become competent to sustain itself. We have less to fear from war than any other nation. The farmers have done their part towards securing this happy state of things. Now we may pursue our career, vindicate our rights, and put forth all our energies, in conscious security. While we rejoice in our strength, that joy should be tempered with gentleness, and evince a spirit of love for all; a love that shall perpetuate tranquility, and cause a continued development of the boundless resources of the country.

SHEEP HUSBANDRY AND WOOL-GROWING IN THE UNITED STATES.

BY HENRY S. RANDALL, OF CORTLANDVILLE, N. Y.

AMOUNT OF WOOL REQUIRED BY OUR POPULATION.

An ordinary laboring Northern farmer, in comfortable circumstances, annually consumes, in dress, bedding, &c., not far from 18 or 20 pounds of wool, in the condition in which our home-wools are sold to the manufacturer. Boys of sixteen, in the same class, who labor on farms, consume about as much as adults. Boys of eight, consume 4 or 5 pounds. Females will not probably average to exceed much beyond one-quarter of the consumption of males.

There is a large class of poorer laboring population which diminish their consumption of wool by the substitution of cotton; and, on the other hand, in the cities, villages, and even throughout the rural districts, there is a large class who entirely exceed the first estimate.

A laborer in the Southern States requires from 8 to 10 pounds of wool annually for his health and comfort; and this is about the ordinary amount received by slaves of an age to labor in the field.

The average annual consumption of the entire population of the United States has been generally estimated by agricultural writers at 6 pounds per nead; I think that 5 pounds would come nearer the actual amount. But to place the estimates which follow, clearly and certainly within the bounds of truth, I shall assume 4 pounds as the average of individual consumption.

INCREASE OF POPULATION AND PROSPECTIVE DEMAND.

In 1790, the population of the United States was	3,929,827
" 1800,	5,305,941
" 1810,	7,239,814
" 1820,	9,638,191
" 1830,	12,866,020
" 1840,	17,069,453

The census of 1850 will probably exhibit a larger ratio of increase; but as the late emigration to our country has been greatly promoted by causes which may not continue to operate permanently, this will be left out of the account. By the first six censuses, it will be seen that our population increases at a compound ratio, exceeding 3 per centum per annum; and 3 per centum, annually compounded, would double it in 23 years and 164 days.

The circumstances which have led to the rapid multiplication of our population—cheap and healthy lands, and consequently abundant provisions at a moderate expenditure of toil—will not be materially diminished until our population considerably exceeds that of Europe, which is to say, between 220,000,000 and 230,000,000. But estimating the rate of increase from 1840 to 1890 at 3 per centum, which would double the population as above stated, and after 1890 at 2 per centum, which would double it in about

36 years, the following would be our population at the periods indicated, and the amount of wool which, according to the previous estimate, would be necessary for their annual consumption:

Year.	Population.	Pounds of wool.
1863–4	34,138,906	136,555,624
1886–7	68,277,812	273,111,248
1925	136,555,624	546,222,496
1963	273,111,248	1,092,444,992

Thus, in 112 years, our population is likely to outnumber the present one of Europe, and our annual consumption of wool to exceed *one billion and ninety-two millions of pounds!* Assuming that sheep average 3 pounds of wool per head—which exceeds the present average product throughout the United States—and it will require over *three hundred and sixty-four millions of sheep* to supply the demand! The States south of the Potomac and Ohio and east of the Mississippi (containing 450,000 square miles) would support all these, at a trifle over 1¼ sheep to the acre!

FACILITIES FOR PRODUCTION.

The wool zones, the wool-growing countries—those where the product is sufficiently remunerating to economically constitute it an important article of production—are mainly comprised within latitudinal zones or belts on each side of the equator, about 15° in breadth, and encircling the earth. Their distance from the equator varies in different longitudes, owing to the various circumstances affecting the temperature: in other words, the wool-zones are bounded by isothermal instead of latitudinal lines. Beginning on the eastern side of each continent, the zone north of the equator includes the country lying between the 30th and 45th degree of latitude, and bearing thence westwardly and northwardly, it terminates between 40° and 55° on the western shores of each continent. I am not definitely informed what isothermal lines in the southern hemisphere would bound the regions of analogous temperature. From the narrowness of both continents, south of the equator in the corresponding latitudes, and their greater consequent modification by the temperature of the ocean, it is probable that the southern wool-zone may extend nearer the pole, and thus be bounded; but, even then, the area of land included in it would be inconsiderable compared with that in the northern zone.

It must be borne in mind, that although the general course of isothermal lines has been followed in giving the boundaries of the northern zone, these lines, and consequently the zone itself, exhibit many minor deviations, owing to the local conditions which affect the temperature, such as elevation, contiguity of large bodies of water, prevalent winds, mountain barriers excluding cold or warm winds, etc. To prevent misunderstanding in the minds of less-informed readers, an instance of each of these exceptions will be noted. A few hundred feet of elevation, usually from 350, diminish the heat equivalent to a degree in distance farther from the equator.* A lofty

* Three hundred feet is the rule given by Professor Leslie, but the experiments of Humboldt, Gay-Lussac, and others, show that this cannot be relied on. It usually requires a greater elevation to produce the effect. In New York, Prof. Emmons has shown that the mean is about 350 feet. See Nat. Hist. of the State.

mountain will therefore exhibit every variety of climate, colder than that of the plane of its base; and, if it stands within the torrid zone, it will consequently exhibit all the climates and their flora, from the torrid to the frigid. For these reasons, the Andes, in South America, must carry, on portions of their declivities, a mild climate, adapted to wool-growing, far north of 30°—even to the equator; and, from a parity of conditions, the Cordilleras of Mexico must extend the northern wool-zone far south of 30°. From the vicinity of large bodies of water, the peninsula of Michigan and the eastern portions of New England have been shown to be exposed to less extremes of heat and cold than the western portions of Wisconsin;* and England, in the latitude of Labrador, has a milder and more uniform temperature than the interior of New York. But in the case of England, the third exception, the effect of prevailing winds, operates in connexion with the one already named: the movement of the westerly wind is such as to prevent the accumulation of ice on the whole north-western coast of Europe, and to carry the ocean temperature *considerably* to the landward. Norway, in the latitude of Iceland and Greenland—and of the basic of the Dionid, where spirits freeze and quicksilver becomes malleable—exhibits the flora of northern Germany. The effects of mountain barriers are to be seen in the differences of the temperature in eastern and western Europe, and in different countries of Western Asia. The Carpathians, Alps, and Apennines are so many successive barriers against the cold north-east winds, which sweep, without obstruction, across the plains of Russia from the Arctic Sea. Southern Russia is therefore colder than France. The north of Persia and south of Independent Tartary are in the same latitude with Italy; but the former, uncovered to the north winds, are cold and inclement, while Italy, sheltered by the Carpathians, Alps, and the innumerable ranges in Turkey, (and the contiguous seas moderating the hot winds of Africa) possesses one of the most delightful climates in the world. The lofty Altays, by cutting off the south winds from Siberia, add materially to the rigors of its own climate.

The valley of the Mississippi, divided latitudinally by no mountain barriers for thousands of miles, is exposed to the free sweep of both the southern and northern winds, and consequently its excesses and fluctuations of temperature in the middle region, where neither wind has yet been materially modified by the prevailing local temperature, reach those enormous extremes which have been noted in the observations kept by the officers of the army. While the annual range of temperature at New London, Connecticut, averaged for 9 years but 78°, it averaged at Rock Island, Illinois, 106°, and at Council Bluffs, 120°.†

There are other considerations besides climatic ones, which practically influence the adaptation of countries to wool-growing. The most important of these are the density of population, and the consequent price of soil; and to these must be added various natural and artificial local peculiarities.

Sheep can never be economically kept to a great extent, for *wool-growing purposes*, amidst a dense population. They would thus be made to occupy lands which should be devoted to the growth of products for human food. Nor can wool be economically grown under such circumstances, and exchanged for the food products of other countries, because this husbandry

* See Forry on Climate of the United States. † Ibid p. 43.

requires so little human labor, that it would not give occupation to a dense population, nor would its proceeds be sufficient for the subsistence of such a population. An acre of land, worth one or two hundred dollars, in an old and thickly populated country, for the production of human food, would produce no more wool than an acre worth but one or two dollars, in America or Australia. The former cannot, therefore, sustain the competition. We see some partial contradictions to this in practice in some of the German states, but this is but temporary. Skill and habit will do something to countervail nature, but wool produced under the circumstances it is in portions of Germany, France, &c., when brought into *full* competition with *similar qualities* grown on cheap and sparsely inhabited lands, will not, for a moment, stand the competition in external markets, nor in domestic ones, unless ruinously forced upon the people of the countries where they are grown, by oppressive tariffs on the foreign article.

The German and French wools alluded to can yet be produced, because neither labor nor moneyed capital demand so good a return where they are grown as in newer countries, and because the supply of the world is short compared with the demand; generally and peculiarly so in regard to a corresponding style of staples.

The above considerations, with certain local ones pertaining to climate, national habits, institutions, &c., will effectually prevent Spain, Portugal, France, the British Islands, Holland, Prussia, Bavaria, the smaller German States, the Western portion of Austria, Switzerland, Italy, Turkey, Persia, Tartary and China, Northern and Southern Africa, in the southern wool-growing zone, from competing successfully with more favored regions, *as soon as those more favored regions are prepared to supply the demand of the world.* This subtracts so great a portion from the area of the *natural* wool-growing zone, that it leaves the United States in possession of, probably, a moiety of that part of it throughout the world, which is adapted also by artificial circumstances to wool-growing.

COMPETITION OF DIFFERENT COUNTRIES IN THE WOOL-ZONE.

South America.—South America, and more particularly Buenos Ayres, possesses great advantages for the cheap production of wool. Lands were here until recently, and are now, for aught I have learned to the contrary, granted by the government, in estates a league square (5760 acres), at ten cents per acre. Its vast *pampas* are plains like our prairies, covered with wild grasses and destitute of timber. Until recently, these were depastured almost exclusively by horses and cattle, which were often killed for their hides. Labor is cheap, and the population sparse.

The Gauchos inhabit the north, and tribes of mounted Indians the southern pampas, who are wild, predatory, and often engaged in war. The culture of sheep has extended of late, and some Europeans have purchased large estates for that purpose. I am not aware that sheep have to labor under any particular local natural disadvantages.* The restless and predatory character of the population and the unsettled nature of the government seem to constitute the main drawbacks on this as on every other branch of industry.

* Still there *may* be serious natural disadvantages. Very little is known of the interior of that country by citizens of the United States.

Australia.—The wool product of Australia and Van Diemen's Land has increased with vast rapidity within a few years. The following statements are from a table compiled from official sources, in Bischoff's Comprehensive History of Woollen and Worsted Manufactures, &c.

In 1810, the export to England was	1,670
1815,	73,171
1820,	99,415
1825,	323,995
1830,	1,967,309
1835,	4,210,301
1840,	9,721,243

Later than this, I am in possession of no official accounts, but *suppose* that the clip of 1850 more than quadrupled that of 1840. One of our most intelligent and best informed manufacturers (Mr. Samuel Lawrence) recently wrote me that the Australian flocks now number 20,000,000 of sheep, and he added, "from thence England receives a large proportion of her supply of fine wool." According to this, the present product should more than quintuple that of 1840.

Professor McCulloch states, that the bad land in this country "bears a much greater proportion to the good than in almost any other." Also, that it is subject to the recurrence of periodical droughts, which sometimes continue for two, three, and even four years together; that the last great drought began in 1826, and did not terminate until 1829; that during the whole of this period, there was often not a single shower in six months,—and that the whole surface of the ground "was so parched and withered, that all minor vegetation ceased, and even culinary vegetables were not raised without much difficulty."*

There was another drought in 1835, and another in 1841. The effects of the latter on the sheep are thus described by Mr. Hood:†

"It will scarcely be believed in England that the estimated number of sheep which have died within the last twelve months in the colony, from catarrh and drought, is 70,000!! that colonists are compelled, in order to save the dam from starvation, to cut the throat of her lamb; that no means are adopted for securing a stock of lambs for next year; or that a stockholder would offer 8,000 sheep to any one that would remove them from his runs, and, finding that no one could be prevailed upon to taint his own flocks by accepting so dangerous a present, had recourse to consuming them by fire, and had actually killed and burnt 2,000."

"The wild and poachy nature of a considerable portion of the pasture," says Mr. Youatt, "gives the foot-rot a peculiar character, and, if neglected, it becomes inveterate, and destroys the animal."‡

The scab is a prevalent disease, and the convict shepherd, who has a pique against his master, can easily, by bringing his flock in contact with a diseased one, subject them to this dangerous and troublesome malady.§

Epidemics, supposed to be owing to the astringency of the water, and some other causes, have, some years, cut off half the sheep.‖

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* McCulloch's "Commercial Dictionary," art. Sydney.
† Quoted by Sprance in "History, Diseases, &c. of the Sheep," London, 1844, p. 67.
‡ Youatt on Sheep, p. 189.
§ Lanny's "Historical and Statistical Account," vol. i. p. 351.
‖ See Spooner, pp. 417–421.

The above extracts are all from *English* writers of reputation, and have not, so far as I am informed, been contradicted.

The minimum government price of lands in Australia is 5*s.* ($1.15) per acre, and but a very little, if any, good land is sold at that price. Mr. Hood states, that the portion of Captain McArthur's immense estate, which was obtained by purchase, cost, on the average, 7*s.* 6*d.* ($1.72½) per acre. Shepherds receive from £15 to £20, ($69 to $92,) *with a house and rations*, per annum; overseers of a superior description, £50 to £60, ($230 to 276,) also *with a house and rations.**

It is about four times as far (13,000 miles) from Sydney or Hobartstown to London as it is from New York to London; and the expense of conveying a passenger from England to Sydney is three times that of conveying him to Quebec.† Under all these circumstances, McCulloch (though he made at the time an error in the price of American lands) justly remarks:

"If slaves could be imported into a colony of this sort, there might be some chance of its succeeding. But, while land of the very best quality may be had in the valley of the Mississippi for about a dollar an acre, or less, we think better of the common sense of our countrymen than to suppose that any one able to carry himself across the Atlantic will resort to Australia."

Hungary.‡—In considerable portions of Hungary, the climate is fine, the soil rich, and, the feudal tenures remaining unabolished, the land is yet held in those large estates so favorable to sheep-husbandry. Prince Esterhazy, the former Austrian ambassador to England, says Mr. Paget,§ owns an estate of something more than 7,000 square miles, including 130 villages, 40 towns, and 34 castles. His sheep are said to amount to 3,000,000.‖ Other nobles own flocks of from 10,000 to 30,000. The demi-savage Magyar serf, whose labor costs nothing, whose principal garment is a sheep-skin, and whose miserable and scanty food is more than half stolen,¶ makes a most *economical* shepherd! Hungary lacks facilities for internal communication, and her convenience to the Mediterranean market, excepting Turkey, so as to first throw her agricultural products into ports where the demand is good, is decidedly inferior to that of France, Italy, and Spain. The Danube is the only natural outlet to her commerce, which, thanks to a liberality of policy on the part of Turkey, contrasting most favorably with that of several *enlightened*** nations under similar circumstances, she enjoys without limitation. To reach Trieste, a long land carriage is indispensable. Her exports, too, are embarrassed by the imposts and narrow restrictions of the imperial government. She cannot therefore export cheap heavy articles, such as provisions, to so great advantage as the Levantine nations; but every circumstance points to her as a country which should be one of the first on the eastern continent for the production of wine, silk, wool, &c.

Southern Russia.††—Separated from Hungary and Transylvania only by the Carpathian Mountains and Turkish Moldavia, lie the fertile provinces of South-eastern Russia, the basins of the Dniester, the Dnieper, and the

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* Report of a "Committee," &c., quoted by McCulloch, Com. Dic. art. Sydney.
† McCulloch.
‡ This article from my "Letters on Sheep Husbandry in the South."
§ Paget's Hungary, Transylvania, vol. i. p. 46.
‖ Youatt on Sheep. ¶ Paget, pp. 18 to 19.
** *E. g.* with that of England in relation to the St. Lawrence.
†† This article is also taken from my letters on "Sheep Husbandry in the South."

Don. From the Carpathians to the Caspian, across the entire extent of the plains of ancient Scythia, not an elevation which could be properly dignified with the appellation of a mountain breaks the immense expanse! The lower valley of the Dniester, or Borysthenes, formerly known as the Ukraine, has been celebrated for centuries for its pasturage, for its horses and cattle; and recently flocks of Merino sheep have been introduced there and successfully crossed with the native variety. In 1839, Mr. Slade states that many of the colonists on the Steppes and in Bessarabia had 20,000 sheep. Merinos were introduced into Crimea or Taurida by M. Rouvier, a French adventurer, in about 1802.* In this favored peninsula, which the learned Pallas describes as little less than an earthly paradise, they have multiplied exceedingly, and extended to Cherson, Ekatherinoslav, Bessarabia, and other provincial governments.† The export of wool from Odessa in 1829, was 3,402 lbs.; in 1830, 21,361 lbs.; in 1831, 35,058 lbs.; in 1832, 41,558 lbs.; in 1833, 65,457 lbs.; in 1834, 66,901 lbs.‡

In one respect, Southern Russia has the advantage over Hungary—it is more sparsely populated, and land is perhaps in still lower estimation. As in the latter, the land, much of it, is fertile and well adapted to pasturage, and the price of labor is next to nothing. But, for causes already adverted to, there is a wide disparity in the climates of the two countries, if we leave Crimea out of view. That of Russia, affected by the north and north-east winds—which the Carpathian Mountains exclude from Hungary—has a winter which for length and intensity is entirely unequalled in the latter, excepting in its northern mountainous regions. Sheep must be housed and fed for some months on dry food in Southern Russia. Taking into view the broad level Steppes,§ and their luxuriant natural verdure; taking into view the climate, warm in summer, cold and exposed to winds of great severity in winter, it strikes me that there must be no inconsiderable resemblance between this portion of Russia and our own north-western prairies in corresponding latitudes, (45° to 46°.) But when the cost of land and labor is taken into consideration, wool can be produced cheaper, in my judgment, in South-western Russia than in Spain, France, Germany, Italy, or any other portion of Europe, excepting Hungary.

The United States.—As already remarked, the United States probably possesses half the cheap fertile lands included in the wool zone throughout the world. Nearly her entire territory lies within it. Experience has amply proved that sheep are healthy in every portion of the United States. The terrible droughts and predispositions to certain diseases encountered by the Australian flock-master—the comparative insecurity of property in Buenos Ayres—the climatic vicissitudes of Southern Russia (with the exception of the comparatively small peninsula of Taurida)—are none of them known in our *most favored* wool-growing regions. Land is cheaper here, and more fertile, and much nearer the great wool-markets of the world than in Australia. Our lands are probably as cheap as those of Hungary and Southern Russia, and, for a long series of years to come, will be practically as cheap as those of Buenos Ayres, because the purchase of only a quarter section (80 acres) of government lands will give its possessor the use of all contiguous ones

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* For the interesting account of this fortunate French Jason, see Slade's Travels in Germany and Russia. London, 1840.

† Slade. Also McCulloch's Com. Dic., art. Odessa.

‡ McCulloch, art. Odessa.

§ Plains, like the prairies, pampas, llanos, &c.

until they are occupied. Lands can actually be bought of the owners, in portions of our territories, at a price not exceeding the government minimum in Buenos Ayres; and in others (in Oregon) they are given to the settler.

Under all the above circumstances, we *ought* to compete successfully with South America, Hungary, and Southern Russia in external markets, to *undersell* Australia in these markets, and, with the discrimination of our tariff of duties against them, to drive *all* foreign wools from our own markets.

The enormously increasing quantities of wool necessary to keep up with the demands of the home market have been given, and we see how futile is the idea that there is any danger of over-supplying it. In fact, we have never grown enough wool to meet the home demand. The following tables will show the imports of the raw and manufactured article for the last few years:

Value of Woollens imported from 1821 *to* 1851.

In 1821	$7,437,737	In 1836	$21,080,003
1822	12,185,904	1837	8,500,292
1823	8,268,038	1838	11,512,920
1824	8,386,597	1839	18,575,945
1825	11,392,264	1840	9,071,184
1826	8,431,974	1841	11,001,939
1827	8,742,701	1842	8,375,725
1828	8,679,505	1843	2,475,154
1829	6,881,489	1844	9,475,762
1830	5,776,396	1845	10,666,176
1831	12,627,229	1846	
1832	9,992,424	1847	
1833	13,262,509	1848	
1834	11,879,328	1849	
1835	17,834,424	1850	

Value of Wool imported from 1837 *to* 1851.

	Wool not costing to exceed 7 cts per pound.	Exceeding 7 cts. per pound.	Total.
Average imports of 1837, 1838, and 1839	$558,458		
Average imports of 1840, 1841, and 1842	759,646	$801,087	$1,359,545
Import of 1843*	190,352	1,004,312	1,763,958
Import of 1844	754,441	54,695	245,047
Import of 1845	1,553,789	97,019	851,460
Import of 1846	1,107,305	136,005	1,689,794
Import of 1847		26,921	1,134,226
Import of 1848			
Import of 1849			
Import of 1850			

* The fiscal year 1842 ended on the 30th September. Since then, the returns of imports have been made up to the 30th of June. The imports of 1843 in the table are therefore only given for nine months.

The table of imports of woollens shows how far our manufactures fall short of supplying the home demand; and the last table, how far our wool product falls short of furnishing the raw material for even this insufficient supply. Each million of dollars in the right-hand column of the last table, represents (with the exception, perhaps, of 1840, 1841, and 1842) about 10,000,000 pounds of wool.

This very year (1850–51) many of the smaller manufactories are stopping *for want of wool.* There is not enough in the home market, and wools are now too high abroad for profitable importation. The general impression is, that less wool was grown in the United States in 1850 than the preceding year, (the causes of which will be hereafter adverted to,) and the Hungarian war, and, perhaps, some other causes, have diminished the foreign supply.

In as favored a wool-growing country as the sun shines on, and where the home production is favored by a discriminating duty of 30 per cent. ad valorem, we suffer not only foreign cloths and wools to come into our markets, but we *actually suffer our manufactories to languish for want of raw material!*

In 1847, Samuel Lawrence, Esq., the leading woollen manufacturer in the United States,* wrote me:

"*The business of manufacturing wool in this country is on a better basis than ever before, inasmuch as the character, skill, and capital engaged in it are such that* FOREIGN COMPETITION IS DEFIED. *A very few years, and all articles of wool used here will be of home manufacture.*"†

The same gentleman recently wrote me:‡

"*The manufacture of woollen goods is now so far advanced in this country, that it will go forward quite as rapidly as* THE PRODUCTION OF WOOLS WILL ALLOW."

PROFITS OF SHEEP-HUSBANDRY IN THE UNITED STATES.

The Northern States.—Let us ascertain the actual cost of producing wool in New York. Flocks of part Merino or Saxon blood, producing wool quite up to the average article in market, are worth, say, $1.50 per head in the fall, and lambs half that price. The annual product of wool is about 3 pounds per head, and of lambs, 80 per cent.; or, if the latter is less, by reason of the number of wethers in the flock, the *growth* of the latter will give a corresponding increase in profit. One hundred sheep, properly littered, and with shelters,§ will make forty loads of manure during five months confinement to dry food. Prime grazing lands, with suitable house, barns, shelters, fences, &c., for carrying on sheep husbandry, are now worth $20 per acre, in the most retired grazing districts. One acre of such land will give subsistence, summer and winter, to three ordinary-sized fine-wooled sheep. The following presents the fair ordinary debtor and creditor side of the account with a flock of sheep:

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* Mr. Lawrence (in connection, I believe, with his brother, Hon. Abbot Lawrence) has far the most extensive woollen manufactories in the United States.

† For the rest of this important letter, see Sheep Husbandry in the South, pp. 124, 125.

‡ January, 1851.

§ If sheep are not sheltered, they make the same quantity of fæcal manure, but it does not convert the same quantity of litter into manure, and a considerable portion of it is wasted by floods, evaporation, &c.

Dr.	
100 sheep, to interest on purchase money	$10 50
To interest on 33⅓ acres of land, at $20 per acre	46 66
" curing and storing hay on 11 acres of above	13 75
" expense of shearing	4 00
" salt, tar, and summer care	4 00
" labor of foddering, &c., during winter, say	5 00
" loss by death, 2 per cent. above value of wool pulled from skins	4 00
	$87 91

Cr.	
By 80 lambs at 75 cents per head	$60 00
" 40 two-horse loads of manure, at 50 cents per load	20 00
" summer manure, say	7 91
	$87 91*

" value of 300 pounds of wool to be added.....

It would be absurd, as the least intelligent farmer is aware, not to estimate the manure among the important receipts of sheep husbandry; and sheep manure made under shelter, the richest of all other farm manures, excepting the dung of fowls, is worth *more* per load than the above estimate, as any one will ascertain who will make an experiment with it on a crop of Indian corn, turnips, &c., of the amount of it which 100 hundred sheep, properly littered, under shelter, will make. I speak from 20 years' experience in this branch of husbandry. What I mean by "properly littered, under shelter," is, that the sheep shall have a proper shed or house accessible to them at all times, and thus be littered down with a moderate thickness of straw, say twice a week—but the sheep not fed in the house. If fed in the house, they would make a much greater amount of manure than I have named. The summer manure is not commonly thought of, because it is scattered over the fields when made. But its effects in *enriching the pasture*, or in *preparing it for a grain crop*, are worth more than I have set it down at—between 23 and 24 cents per acre, per annum. The whole above estimate is intended for flocks numbering say 300 and above. For one single hundred, the cost would be a little more. The common estimate among farmers in New York, who keep small flocks, is, that it costs $1 per head to keep sheep throughout the year; but then in small flocks the returns are usually better. The sheep get a better range, more condition, and consequently more wool, and the lambs are larger and will sell for more. It is, therefore, also the common estimate among farmers, that the lambs and manure will pay for keeping the sheep, and that the *wool is net profit.*

According to a table formerly by me, the average price of wool per pound from 1832 to 1845, inclusive, was 39⅞ cents.† This would give a net profit of $1.18⅝ per sheep, or $3.56¼ per acre—a fraction over 17¾ per cent. on the value of the land. Many excellent farmers in New York and New

* Note by the Editor.—Mr. Randall's calculations are very extravagant. One hundred sheep, (half males,) will not produce 80 lambs worth 75 cents per head, nor will the hay from 11 acres, after manuring the land to keep up the supply of mineral elements removed in the crop, yield dung and urine to the amount of $20. So much *value* in manure from hay, which it costs but $13.75 to gather, (which manure the meadow that produced the hay really needs,) cannot be realized.

† For Table, see "Sheep Husbandry in the South," p. 53.

England keep large flocks of sheep on lands worth $40 per acre—and still find, as will be seen, a better remuneration than the legal rate of interest on money.

Still, causes are operating which are rather diminishing than increasing this branch of husbandry throughout New York and New England. These are the extraordinary recent profits of dairying, and the prospect that they will be continuous—the far better adaptation of the climate to cows than to sheep—the perfect knowledge of all sensible agriculturists, that they cannot compete with the Southern or even the North-western States in wool-growing, and the strong temptations which frequently occur to part with sheep.

The comparative profits of dairying it is not necessary here to discuss. They have, recently, undoubtedly come to equal or exceed those of wool-growing: they are generally thought by farmers to exceed those of ordinary flocks of sheep. The impression also generally and justly prevails, that our climate is a severe one for sheep, where they are kept in any considerable numbers, unless they are well sheltered in winter, and receive considerable other care; and, when these expenses are added to those of foddering five months, every intelligent farmer knows that he cannot compete with wool-growers in a region where lands are far cheaper, the expense of foddering, shelters, &c. far less. The 5° of the wool-zone, north of 40° on the east and 45° on the west shore of the continent, may be considered the DAIRYING-ZONE of our country. Our farmers believe that south of 40°, (on this side of the Mississippi,) though the cost of keeping cattle may be less, butter and cheese can never be produced which will compete in quality with those articles manufactured in New England, New York, Northern Pennsylvania, &c.* Dairying is therefore regarded as not only as much or more profitable at present, but as holding out the greatest prospect of permanence in profit. The temptations which the Northern farmer has to part with his sheep are manifold. The consumption of mutton is vastly increasing in the cities and in the country. The average prices of the better qualities have become above those of *beef in the New York and Boston markets.*

Every small village even now affords an active mutton-market in the fall months, in proportion to the number of the population. I have put down the average price of lambs at 75 cents per head in the fall—but, so far as my experience extends, every fat earlyish lamb readily finds a market at $1 to $1.25 per head, with the country butchers. Ten or 20 lambs are thus killed for consumption throughout the country, where, a few years since, one was killed. And the same remark would apply in nearly as great an extent to fat sheep. Farmers very wisely kill more of them than formerly, to obtain their fresh meats. Pelts (skins with the wool on) have been so high this past fall, that vast numbers of sheep have been killed, because the pelts and tallow, and the meat of those fat enough to eat, would exceed the ordinary price of sheep.

The tendency of all these things is to break up great flocks kept for wool-growing purposes in the north, and to substitute breeds of greater size and earlier maturity, to meet the demands of the provision-markets. Within 20 years, and perhaps half that time, very few sheep will probably be kept in the old Northern States for wool-growing purposes. This husbandry

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* And it is also believed that the States west of Pennsylvania do not now, at least, produce as good butter and cheese, if they ever can. I see no reason why they cannot, when the domestic grasses are generally introduced in the Western States.

may first flow west, but ultimately, as soon as *the population take the necessary steps*, it must go SOUTH OF 40°. This is as inevitable as the laws of cause and effect.

The Southern States.—Other things beside climate being equal, the country lying south of 40° on our Atlantic, and from 45° to 50° on our Pacific shore, *are equally or more healthy for sheep* than the countries lying north of them. Sheep are there exposed to no more diseases than in the north—they are not so much exposed to catarrhs or colds—and late lambs, old or feeble sheep, &c. are less liable to be cut off by the winter climate. These facts I have learned from answers, received from gentlemen of the first character in nearly all the Southern States, to inquiries in regard to this and kindred topics which I have been pursuing for years.* Their replies have been uniform in tenor on this point, and, within the last few years, I have sent colonies of Merinos to a large number of localities—embracing almost every variety of Southern climate, soil, verdure, &c.,—and, although I have aimed, as far as practicable, to keep myself informed of the history of every such colony, I have yet to learn the first instance where the sheep have not thriven and been substantially free from disease.† Spain, the native country of the Merinos, and where they flourished most successfully for ages, though farther north than our most Southern States, is, at the same point of elevation above the sea, warmer than the latter.

The effect of warm climates on the staple of wool is to make it *longer and softer*, and thus more valuable. This was the concurrent testimony of the numerous wool-merchants, staplers, &c., who were examined at the investigation into the state of the woollen trade, &c., in the British House of Lords, in 1828,‡ as it is of the most eminent growers, manufacturers, staplers, &c. of our own country.§

And the Southern fine wools are in *all* respects of the most valuable and desirable quality. Mr. Samuel Lawrence, who has purchased largely of them, writes me, (January, 1851,) "The unprecedented success of 'sheep husbandry' in New Holland illustrates the truth that southern latitudes are favorable to the production of fine wools, and the superior flocks of Virginia, Kentucky, and Tennessee prove that those of the other South-western States of our country are peculiarly adapted for this invaluable staple."

After speaking of the "sheep husbandry" of England, where sheep are grown principally for mutton and manure, where wool is but of subordinate consideration, he adds: "My impression is it will be for the interest of the flock-masters in the Northern and Western States to pursue a similar course:" and thus, (for such is his meaning,) give up wool-growing to the Southern States.

The Western States, even north of 40°, can, no doubt, from the cheapness of their lands, raise wools at a better profit than New York and New England, but they have the same long winters and period of dry foddering;

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* For some of the most interesting of these, up to 1848, see "Sheep Husbandry in the South."

† Besides the case of an individual in Virginia, who wrote me that two lambs sent him had been afflicted by some disease unknown to him, I have not heard of one being ill—not *even on the low rice-lands* of South Carolina.

‡ See Bischoff on Wools, &c., vol. ii. pp. 118 to 200; or, for an abstract of it, "Sheep Husbandry in the South," pp. 23 to 29.

§ Mr. H. Blanchard, of the Kinderhook Wool Depot, recently wrote me that he had observed this fact in the wools received by him. Other testimony of this kind will be found in "Sheep Husbandry in the South."

and consequently it places an insuperable and eternal barrier in the way of their competition with equally productive lands, as low in price, from five to ten degrees further south.

The profits of sheep husbandry in the South are multifarious, beyond those simply of direct profit on capital invested; as, for example, to constitute the basis of amelioration in exhausted soils, and of a system of convertible husbandry. But it is only with the first that we now have to do, and what are the direct profits on capital invested.

Lands containing more or less herbage, on which sheep will subsist and thrive, can be found in all the Southern States at $1, and often as low as 50 cents per acre.* These lands consist of worn-out cotton and tobacco lands, and those naturally unadapted to those staples, of mountain sides, and, west of the Mississippi, of the prairies: even the forests will subsist sheep. Mr. M. R. Evans, of Mobile, Alabama, recently wrote me that his own and some other flocks had subsisted throughout the year and kept in fine condition in the *pine forests* about Mobile, without being once fed. Eastern Virginia and Kentucky do not probably demand to exceed one-third, and certainly not to exceed one-half of the winter feed of New York and New England; and south of these, on large ranges, sheep will subsist the year round without fodder, unless on very high lands. But if the number of sheep were largely increased, it would become necessary to provide winter feed, either dry fodder or some green crop, like rye. Mr. Evans also wrote me the following exceedingly interesting facts:

"I lived three years in western Texas, before my location here two years ago. I had there 1,000 head of sheep, and can say without hesitation that the Musquvoit prairies of that section offer greater inducements for wool-growing and sheep husbandry than any country I know any thing about. Sheep are hardy as goats—no disease—no ticks—and they yean both spring and fall. Musquvoit grass is an evergreen. I have seen the prairies in winter as green as fields of wheat in April; and no shelters are necessary. And then the herbage and grass of those rich prairies are now nutritious, and much larger numbers of sheep may be kept together. Land is cheap there, and the purchase of a quarter section gives privilege over thousands of acres. The country is healthy, with an abundance of pure water. I could procure a fat mutton there at any season of the year. I knew one man who had over 2,000 head in one flock, and when the Mexicans were prosperous about San Antonia, twenty or thirty years back, some of them had flocks of five to ten thousand subsisting on the prairies the year round."

This reduces the cost of growing wool to a mere trifle! General Houston fully confirms the statement of Mr. Evans, and thinks that those evergreen prairies include the greater portion of a country six hundred miles long and three hundred broad!

It is difficult to fix on a proper estimate of the interest on those lands which should be devoted to wool-growing in the States south of Virginia, for, at best, it would be but nominal. Summer pasture costs *nothing*, now, on "*the range*" (unenclosed lands) in those States.† The rye or barley pastures for winter can scarcely be counted as an expense, because the crop

* I regret that limits do not permit me to give particulars and authorities here; but I must again refer to "Sheep Husbandry in the South," where these are pretty fully given, though I am in possession of later ones of great interest.

† See Report of Hon. R. F. Simpson, late M. C. from the Pendleton District, South Carolina. Sheep Husbandry in the South, appendix, p. 398.

is not thereby lost. Farmers in the Pickens, Greenville, and Spartansburg districts of South Carolina will winter sheep for ten cents per head, and often warrant against losses by death.* In many other regions, the cost would not exceed this, even where they were *hired* kept. But we will suppose *unenclosed* lands to cost $1 per acre, and that one acre will give subsistence to two sheep. It would require the labor of a man to oversee 600 sheep. This labor would be worth, in the South, about $75 per annum, and I put the extra labor of shearing half the price of Northern day-laborers, or $12½ per hundred. The account would then stand thus:

	Dr.	
To interest on 300 acres of land at $1 per acre	$21	00
" " 600 sheep at $1 50 per head	63	00
" labor of one hand	75	00
" extra labor for shearing	12	00
" salt, say	5	00
" loss 2 per cent. above value of wool pulled from skins	12	00
	$188	00
	Cr.	
By 1800 pounds of wool at 33⅓ cts. per pound	600	00
†480 lambs, at 75 cts. per head	360	00
	$960	00
Add, for manure		

Manure improves the quality of land and makes it susceptible of *carrying more sheep* or raising *more grain* in the same proportion in the South that it does in the North. To say that one acre, with privilege of range, will support but two sheep, is a low estimate: I have also put the average price of fine wools at a very low mark, lower than they have averaged for the last 20 years. I have done this to cover all contingencies, trouble, and expense of marketing, &c.

It would not probably cost any more in wooded regions to fence sheep-walks into very large fields. It would raise the value of lands, but it would dispense with the labor of a shepherd to every, say, 600 sheep.

By the above estimate, the cost of producing wool in the South is between 9 and 10 cts. per pound; in the North, *nearly three times that amount.* But I am satisfied that wool can be produced at 8 cts. per pound, to almost any quantity, in the South, and it frequently now is, as I know, at a cost not exceeding 5 or 6 cents per pound.

Can any portion of the world grow wools cheaper than this? And to show the unutterable absurdity of allowing South American wools, with a 30 per cent. duty against them, to drive ours out of our markets, let us look at a few facts.

The duty on wool costing 7 cents, is 2 cents and 1 mill per pound. This wool is imported in the grease and dirt, and will lose about half weight by washing, so that every pound of *wool* actually pays a double duty, or 4 cents

* Hon. R. F. Simpson. See his letter to me, in Sheep Husbandry in the South, pp. 59, 60.

† Note by the Editor.—Six hundred sheep (half males) will not rear 480 lambs; nor half of that number, one year with another, without unusual care.

and 2 mills. If, on the other hand, the wool is washed prior to exportation, the reduction of weight one-half would require a doubling of the price. A pound of wool, in reality, in either event, costs 14 cents, and pays a duty of 4 cents and 2 mills. To this, cost of transportation must be added. Thus, if the *revenue laws are not fraudulently evaded*,* every pound of the so-called 7 cent wools costs not far from 20 cents in our market; twice and a half the cost of producing wools of *more than double the value*, (unless there is fraud,) in vast portions of our Southern territory, to say nothing of extraordinary localities, like those described in Texas.

THE BREED OF SHEEP ADAPTED TO WOOL-GROWING.

This topic requires little discussion, as, for general *wool-growing* purposes, there is but one breed in the world entitled to a moment's consideration. This is the Merino.

The Merino has, by breeding and cultivation, been divided into varieties, some larger and carrying more wool than others, some finer, and some coarser. Size, within moderate limits, is not *per se* a matter of any consequence: nor is the amount of wool per head, provided the smaller sheep bears as much in proportion to its consumption as the larger. By a universal law, the larger animal of the same species consumes a proportionably greater amount of food than the lesser;† and the true question for the farmer to ask, in determining his best variety, is not, how much wool will a given number of sheep produce, but how much wool will the herbage of a given number of acres produce? Deep, rich, luxuriant, and unfailing herbage will carry *large* animals; that which is less abundant or nutritious, or is liable to become parched or poor, is better adapted to those of moderate size. Precisely the same rules apply here that do in breeding horses or cattle; their size should *be adapted to their feed*—should *not be too large for their feed.* Very large or very small animals, of any kind, I never have thought so hardy, healthy, and capable of taking care of themselves, as those of medium size.

Shape is of much more consequence than size. This should indicate hardiness of constitution; and here again the rules are much the same that we would employ in judging of other animals where speed of motion is not required. A sheep should be broad and straight backed, round carcassed, cylindrical, rather than tunnel-shaped, (that is, carrying its breadth and depth into the fore-quarter, instead of tapering off in the shape of a tunnel,) with short and straight legs; the neck full, round, particularly so at its junction with the body, and set on in a line with the back; the head small, conical, and well carried up, the eyes lively, and the countenance bright and pleasing.

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* As they no doubt most shamefully have been, by a fraudulent system of invoicing. A sends out B and C to Buenos Ayres; B buys a good quality of wools, and pays the true value for them, 14 cents, perhaps. He then resells these wools to C for 7 cents, and they are invoiced accordingly. C is not informed that there is any collusion, and therefore is *not* bound to know it! This is *said* to be the modus operandi; but, after all, if the revenue officers understand their duty, and rigorously perform it, there is no need of such a fraud becoming successful. No artifice of this kind could, for a moment, mislead a respectable judge of wools.

† Spooner put this at 3½ per cent. of their weight, daily, in dry hay or its equivalent; wet places at 2½. My experience would say, half-way between. But whatever the per-centage of consumption, it is *proportionable* to the weight.

The quality of the wool is a question of circumstances; but, in the South, the finer grades are indicated, because it is in these qualities that other regions can less contend with them, and have less inducements to attempt it. Merino wool ranges from the finest Saxon to medium. The Saxon Merino, or Saxon sheep, is ordinarily a comparatively tender-constitutioned animal, because, in his breeding, every thing else was, for a long time, sacrificed to the *quality* of the wool, and he degenerated in constitution. Merinos, descended from the original Spanish family, can now be found, which equal ordinary grades of Saxon in fineness, and they usually are thicker woolled, and are a hardy sheep. I consider them therefore decidedly preferable to the Saxons, for those who do not intend to pay a much more than ordinary attention to the care of their sheep, and especially for new beginners in the husbandry, who require a hardier sheep. Whatever the grade of the wool, economy demands that it be *thick* on the animal, not only to make a good return for the food consumed, but as a protection from the weather. It should extend evenly all over the animal, except on the legs below the knees, and on the face; on the latter it is unsightly, of little value, and frequently impedes the sight of the animal, so that it falls an easy prey to any enemy. It should be as even as practicable in length and *quality*, all over the animal. The wool should open a pure, glittering white, with some, but not an excess, of oiliness, and the skin should be mellow, and of a bright pink, as contradistinguished from a livid or tawny hue.

Pure-blooded sheep are, of course, more desirable than any other, and, in the male progenitor, it is the height of folly to use any but a pure-blood animal, under any circumstances. But, to attempt to fill up our unoccupied sheep lands exclusively with pure bloods would be a matter requiring much time and expense; and it is perfectly well known to all practical breeders, that sheep of a most desirable quality are readily, and in *three or four generations*, produced by crossing any good, strong, healthy stock of ewes with pure-blood rams of *the proper stamp*. The readiest and most economical method, therefore, is to select from the stocks to be found in the country, and thus cross them; and it is always well to have a small supply of pure-blood ewes, both to supply rams and to gradually grow a pure-blood flock. In obtaining these, great care should, of course, be had, not only to *individual excellence*, but to *absolute and undoubted purity of blood*.

With good Merino rams, the second or third crop, with the most ordinary ewes, will produce decidedly more wool per head than I have estimated, as the average of our country and the quality will be fully up to the average of those now ranked in the general class of fine wools. At the third or fourth cross, it may be made to rank almost in the first class. These facts I have practically demonstrated in innumerable instances. The practice of crossing with existing or coarser breeds has been that of Australia, the Cape of Good Hope, Buenos Ayres, Southern Russia, and all other new wool-growing countries.

AGRICULTURAL EDUCATION.

We have received from the Hon. Marshall P. Wilder, chairman of a board of commissioners appointed by the Legislature of Massachusetts, an extended and interesting report on the subject of agricultural education. It contains an instructive account of the principal colleges and schools in England, Scotland, Ireland, France, and other continental nations, designed to teach the several arts and sciences which pertain to rural affairs, from the pen of Professor Hitchcock, who devoted some months, while abroad, to collecting the information given. The Royal Agricultural College at Cirencester has six professors and 700 acres of land for agricultural purposes. The object of this institution is to prepare young men to become intelligent proprietors of farms, or to superintend in the most skilful and successful manner the farms of others. From the unhappy operation of *caste* in English society, says Professor H., and from the want of governmental patronage, this college is not so well attended as its founders anticipated. There are accommodations for 200 students, but only 50 now belong to the school. Those residing in the building pay $355 annually; those who board elsewhere, $175. Formerly, the school was open for the sons of the smaller farmers, but could not find support on that plan, and it was found that, if these attended, the wealthier classes would not send their sons. The price, accordingly, has been raised, and none but the sons of gentlemen, such as clergymen and wealthy laymen, now attend. None of the nobility send their children, although many give their money for its support.

The impassable barriers of *caste*, happily, do not exist in this republic; and it would be impossible to establish an experimental farm of 700 acres, erect suitable buildings to accommodate 200 students, appoint six able professors, aided by museums to illustrate natural history, comparative anatomy, vegetable and animal physiology, and provided with a chemical laboratory for making original researches, cabinets of minerals, and all other needful appliances, and not have the institution crowded with students.

The agricultural school at Grignon, near Paris, is in a much more flourishing condition. "In going through a stable," says Mr. H., "containing a number of fine cattle, I observed one young man, with water and a broom, cleaning the legs of an ox which had lain down in his leavings. The director whispered to us that that young man was the son of a wealthy banker. Indeed, the pupils all appeared as if they had not been accustomed to labor. Formerly pupils were admitted from the laboring classes to attend the lectures, without residing in the institution, but they are now excluded. They now pay 750 francs, or $138, for board, and receive nothing for their labor. This institution receives $1,100 annually from government."

Already it has sent out nearly 600 pupils, and the present number is about 80. The farm connected with the institution contains 750 acres. The system of instruction and study is extensive and thorough, embracing algebra, geometry, mechanics, surveying, levelling, stereometry, (measuring solid bodies,) linear drawings, in the mathematical sciences; meteorology, mineral chemistry, mineralogy, geology, and botany, in the physical sciences; organic chemistry, or agricultural technology, agriculture, arboriculture, sylviculture, veterinary art, agricultural zoology, and equitation, in what are denominated technological sciences; and rural architecture, forest

economy, farm accounts, rural economy, and rural law, in the noological sciences. There are six professorships, and three years are required to go through with a course of study.

At Versailles there is a National Agronomic Institute, employing nine first-class professors and 3,650 acres of land. The report of Professor Hitchcock fills over ninety octavo pages, and we regret our want of room to give copious extracts from this truly valuable contribution to the agricultural literature of the United States. It is a work of great labor and condensation. Without the text, the thirteen tables would be nearly unintelligible. The following summary, however, will indicate the territory surveyed:

"But though my list is doubtless deficient, I have been amazed, as I doubt not the committee will be, at its extent. The following summary will bring the whole subject under the eye:—

SCHOOLS.	Superior Schools.	Intermediary Schools.	Inferior Schools.	Special Schools.	Connected with Colleges and Universities.	Total.
In England	1	...	4	...	...	5
In Ireland	1	25	34	...	3	63
In Scotland	...	...	...	...	2	2
In France	5	...	70	...	...	75
In Italy	...	...	1	...	1	2(*l*)
In Belgium	...	3	2	1	3	9
In Prussia	3	2	12	13	2	32
In Austria	4	...	3	25	1	33
In Wurtemberg	1	2	1	3	...	7
In Bavaria	1	1	32	1	...	35
In Saxony	1	3	...	1	...	5
In Brunswick	...	1	1	...	...	2
In Mechlenberg Schwerin	...	1	...	...	...	1
In Schleswig Holstein	...	2	2	...	...	4
In the Principality of Anhault	1	1	...	...	...	2
In the Grand-Duchy of Hesse	...	2	...	...	...	2
In the Grand-Duchy of Weimar	...	...	...	...	1	1
In the Duchy of Nassau	1	...	...	...	...	1
In the Electorate of Hesse	1	...	...	...	...	1
In the Grand-Duchy of Baden	...	1	...	...	...	1
In the Duchy of Saxe Meiningen	...	...	1	...	...	1
In Russia	2	10	51	4	1	68
Total	22	54	214	48	14	352"

The 22 "superior schools" in the above list will rank with our best colleges in the extent and variety of sciences studied, while the 54 "intermediary schools" will compare favorably with most American colleges. It is remarkable that the United States should not contain a single institution of the kind, and that all efforts to establish one in the great State of New York, for the last thirty years, should prove unsuccessful. Nor has the report of the Massachusetts commissioners been favorably acted on, even in a State so distinguished for its liberality to all other educational institutions. One serious impediment has been the lack of well-qualified gentle-

men to fill the several professorships. These must be educated in Europe before we can establish a first-class professional school. When medical schools were first founded in this country, nearly all our teachers of anatomy, physiology, surgery, theory and practice of physic, &c. were educated abroad.

Professional schools of a high character could be established in no other way. Doubtless, Congress might establish an institution of the scientific grade of West Point Academy, and procure such gentlemen as Leibig, Agassiz, and Boussingault, to serve as teachers until a reasonable number of talented Americans could be prepared to fill professorships in State agricultural colleges. At present, we not only lack institutions of this kind, but gentlemen duly qualified to teach all the sciences that legitimately appertain to the noble profession of agriculture and husbandry. The people of the United States have over three hundred millions of dollars invested in domestic animals, and if a young farmer engaged in stock-growing wishes to study the digestive organs, the muscles, nerves, or blood-vessels of the horse, cow, sheep, or hog, there is not a museum in all America where this can be done, and he must cross the Atlantic for the purpose, or remain in ignorance. We do not depend exclusively on books to teach the anatomy and physiology of man, but make dissections, have ocular demonstrations, and valuable museums still further to illustrate all parts of the system, both in a healthy and diseased condition. Why should we be so unwilling to form agricultural museums? Why so reluctant to provide facilities for the successful study of the organization of valuable domestic animals, with a view to preserve their health, increase the growth of flesh, fat and wool, and the production of milk, butter, and cheese? Will it be said that a knowledge of all this living machinery can be of no value to the country? Is there no chance for additional improvement in thirty millions of sheep which elaborate wool and mutton, nor in the five or six millions of cows which yield all the products of the dairy in the United States? On the contrary, is there an intelligent man in the Union who does not know that nine-tenths of all our domestic animals, from the horse down to dung-hill fowls, are susceptible of very great improvement?

In 1818, William King, of Wurtemberg, established an Institute of Agronomy and Forests on the royal domain, of some 825 acres, having one director, six professors, four functionaries charged with various labors, besides two tutors who hear lessons in the school. The instruction given is embraced in *forty courses*, divided into three groups: 1. Agricultural matters. 2. Forest matters. 3. Auxiliary sciences. In the 1*st* course are included—1. Of climate; 2. Of soil; 3. Of manures; 4. Of tools and implements of tillage; 5. Of clearing up of ground; 6. Of meadows and pastures; 7. Of agriculture in general: this is divided into ploughing and other tillage, seed-plots, of grain and root-culture, threshing and preservation of grain, &c.; 8. Of special agriculture. All cultivated plants are treated of particularly. 2*d* course—Viticulture; 1. Culture of the vine; 2. Wine-making. 3*d* course—Culture of fruit-trees. 4*th* course—The rearing of cattle; the races; the crossing; the young. 5*th* course—The rearing of the horse; natural history of the horse; different methods of raising; choice of animals for reproduction; treatment of mares; treatment of colts. 7*th* course—Rural Industry in *winter*, the manufacture of beet-sugar; of liquid manure; of malt beer and brandy. In *summer*, manufacture of beer, vinegar, cider, lime, and draining tiles. 8*th* course—*Rural Economy:* Valuation of real estates; general circumstances of the country; of farms in general; of

different parts of the same farm; of the home means of maintaining its fertility; of systems of culture; of labor and the internal organization of a farm; relation between the number of beasts and land worked; of capital of the undertaker or farmer; of the different modes of working a farm. 9*th* course—Agricultural book-keeping, &c.

We omit all the details on "Forest Matters," although forest-culture is destined to become an important interest in this country much sooner than many suppose.

3. AUXILIARY SCIENCES.

1*st* course—Higher arithmetic. 2*d* course—Algebra. 3*d* course—Planimetry. 4*th* course—Stereometry. 5*th* course—Trigonometry. 6*th* course—Applied geometry. 7*th* course—Mathematics applied to forests: 1. Of the culture of trees and of the entire forest; 2. Of the increase of trees; 3. Of the valuation in money of forests. 8*th* course—Physics. 9*th* course—Mechanics. 10*th* course—Chemistry. 11*th* course—Oryctognosy. 12*th* course—Geognosy. 13*th* course—Vegetable botany and physiology. 14*th* course—Special and rural botany. 15*th* course—Zoology. 16*th* course—Veterinary medicine; 1. Natural history of our domestic animals; 2. Anatomy of do.; 3. Animal physiology; 4. Care t be taken of animals; 5. Of the medicines proper for slight diseases; 6. Description of diseases, pathology, and therapeutics; 7. Veterinary surgery; 8. Internal diseases of animals, and murrains. 17*th* course—Of forest law. 18*th* course—Rural constructions. 19*th* course—Of preparing plans. 20*th* course—Drawing of machines.

To illustrate these courses of instruction, the means seem to be very ample at Hohenheim. They are as follows:—

The operations on a large farm annexed to the Institute. A forest of 5000 acres. A botanic garden. A library open twice a week. A geological collection. A mineralogical do. A botanical do. A collection of woods, seeds, and resins, from the forest. A collection in comparative anatomy. Do. of specimens of wool. Do. of agricultural products. Do. of models of instruments for tillage. Do. for physical science. Do. for chemistry and laboratory.

Students board where they please, at a price from $24 to $120 per annum, but lodge at the Institute. The number of students in 1849 was about 100, but it had been 140 for many years. No less than 1650 finished their education at this seminary within 31 years. Dr. Hitchcock pertinently asks—"How is it possible that so many, having gone through such a thorough system of instruction, should not exert a powerful influence upon agriculture throughout the community?"

If the number of students appears small, it must be borne in mind that the small town of Hohenheim has 7 agricultural and horticultural schools of an inferior grade.

In Saxony, there is a superior school, with 9 professors, and a domain of 7,355 acres. Brunswick has a superior school with 13 professors. This practice of subdividing the business of teaching among so many professors, each of whom gives his undivided attention to the advancement of a particular art or science, secures that pre-eminence in German universities and scholars for which they are distinguished. Is it not possible for the United States to have one school worthy of the republic?

MISCELLANEOUS COMMUNICATIONS.

Delaware County Institute of Science, Pennsylvania,
Hall of the Institute, January 7th, 1851.

Dear Sir:—I am directed by the Institute to communicate to you their thanks for many packages of valuable seeds, reports, &c. from your office, and to say that the institution has directed a large share of its attention to agricultural subjects, (a majority of its members being thus practically engaged,) and will receive with pleasure, and test by suitable experiments, any seed or grain, &c. you may forward in future. The lively interest felt in the agricultural department of your office, will, at all times, secure the hearty co-operation of the institution, to the extent of its limited means.

I have the honor to be, &c.,

JOSEPH EDWARDS,
Corresponding Secretary.

To Hon. THOMAS EWBANK,
Commissioner of Patents, Washington, D. C.

Lima, Delaware County, Pennsylvania, January 7th, 1851.

Sir:—Your Agricultural Circular, dated August, 1850, was duly received, together with a note acknowledging the receipt of our communication in 1849. The Delaware County Institute of Science, under whose instructions that and a former report were made, having received the circular through our representative in Congress, directed the undersigned to prepare a reply in conformity with your suggestions. Many of the queries in the present circular are but slightly variant from a portion of those of former years, which, though then answered in detail, may, under the probability that each report will reach the hands of other readers, justify a review of our agricultural experience and condition, even if it shall involve the necessity of occasional slight repetitions. To enable the practical agriculturist to appreciate fully the information furnished by your correspondents, a general view of the local natural conditions, such as the character of the soil, climate, elevation, general humidity, &c., so materially influencing the result of any system or experiments, should, we conceive, in all cases, be particularly given. Delaware County, Pennsylvania, is situated on the west side of the River Delaware; the centre at about 15 miles W. S. W. from Philadelphia, and crossed north of the centre by the 40° of N. latitude; territorial area, 177 square miles; population, 24,640, or 140 to the square mile, containing the earliest settlement in the State. The surface is undulating, with a general inclination to the S. E., and rises gradually from tide-level to a mean elevation of about 450 feet at its N. W. boundary. An alluvial belt, bordering on the River Delaware at tide-water, is succeeded north-westward by a band of primitive rock formation, covering the remaining surface of the county, first, by a zone of gneiss, some 4 miles in width, extending from N. E. to S. W. nearly, followed by a belt of serpentine, of nearly equal width, and the latter by a band, some 8 or 10 miles wide, characterized by various modifications of gneiss and kindred rocks, extending beyond the

limits of the county to the slate-ridge bordering the primitive limestone-valley of Chester County. Trap-rocks, in a few localities on either side of the serpentine belt, have protruded to the surface in the eastern sections of the county; mica slate near the centre, and limestone in a few detached spots in the extreme west. Interspersed throughout the serpentine belt, are comparatively large areas of silicious rocks, in various forms and compounds, requiring large and frequent supplies of fertilizing agents to maintain a satisfactory degree of productiveness. The more generous qualities of the soil, in other and adjoining sections, need much less artificial aid. The whole surface of the county, with trifling exceptions, is, however, in a high state of cultivation. In common with all the territory bordering on, and contiguous to the west bank of the Delaware, this county is traversed by numerous mill-streams, generally having their sources north-westward beyond its limits, and, by channels deeply-indented, nearly parallel, and from 2 to 3 miles asunder, which discharge their waters into tide-water, in the Delaware, on the S. E. The valleys of these streams are intersected on either side by continually recurring minor valleys and their accompanying streams, deriving their sources from springs on every farm, and frequently in every field, up to the dividing-ridge, at a mean elevation of about 200 feet above the creeks. This rolling character of the surface, with scarcely any declivity too abrupt for cultivation, or a single acre too low for drainage, with everywhere an abundant supply of streams and springs, is well-adapted to the business of dairy husbandry. These streams, great and small, meander through valleys of various widths, moderately fertile, of rapid descent, with gradually sloping sides, generally admitting of irrigation almost continuously throughout their extent. Thus almost every farm in the county has, or may have a portion of natural meadow, watered by the overflow of streams, or artificially by irrigation: in either case they are highly productive, and furnish two crops for hay annually, and perpetually, together about 2½ tons per acre, of the very best quality for dairy stock, without exhausting the soil, or other cultivation.

The character of the soil varies essentially in different localities, as may be inferred from the description of the rocks already given, embracing every variety, from nearly sterile to highly fertile. Clay predominates in the S. E., in the vicinity of tide-water, (except the alluvial of the river flats,) and also in a few detached localities inland; but the largest portion of the surface consists of soil formed from the disintegration of the local rocks, and may be termed a sandy or gravelly loam, impregnated everywhere by more or less ferruginous matter, and nearly destitute of lime; this latter defect has, however, been to a great extent corrected within the last 30 years, by a liberal admixture, applied in the course of cultivation. In the serpentine belt, magnesia and chrome exist to an extent, in many spots injurious, if not destructive to vegetable life. To neutralize the defects, and render available all the advantages now afforded by our varieties of soil and situation, have taxed the ingenuity and the industry of our ancestors through the five preceding generations. The entire territory of the county, except in the vicinity of villages and manufactories, is divided into moderate-sized farms, varying from 20 to 200 acres each, but principally from 60 to 100 acres; and these, whatever their size, into from 7 to 12 enclosures, viz. one natural meadow, one in timber, and the residue, more or less, for cultivated crops. The farm-buildings are mainly constructed of stone, and sufficiently capacious to admit the storage of the whole produce of the farm,

and shelter for all stock, carriages, farming utensils, &c. In all cases, when practicable, the farm buildings are located in the immediate vicinity of a spring of water, over which is erected a substantial stone structure, and other appliances suitable for conducting the operations of a dairy, and, when convenient, the stream therefrom passes through the barn-yard, for the use of stock in the winter. The high estimation in which the fresh butter, veal, and poultry produced in this section of the State, are held in the markets of Philadelphia, New York, Baltimore, and Washington, and the present facilities of reaching them at a trifling expense, have rendered the production of these articles the most profitable application of the soil. To furnish the greatest quantity of suitable provision for dairy stock is, therefore, the leading object of the farmer, and gives character to our entire system of cropping. Experience has proved that land laid down in grass will not produce the maximum quantity beyond 4, or at most 5 years, in succession, without reploughing, whatever may be the natural or artificial stimulants; and as this has become the most profitable and desirable crop, the cultivation of the several grain crops follows as a matter of expediency, rather than choice. Thus influenced, our system of cropping may be briefly stated as follows, viz.: First, Indian corn, succeeded in the following order, by oats, wheat, and grass; the latter depastured the first year after the wheat has been removed, cut for hay the second and third years, and then appropriated to pasturage until reploughed; each field receiving like treatment in all respects as that preceding it. Thus every farm presents at all times the following phase:—One field under cultivation with Indian corn, one with oats, one with wheat, one or two producing grass for hay, (as there may be more or less natural meadow,) and the residue as pasturage. On small farms, the oat crop is usually omitted, and the corn followed in the same year by wheat. This would in all cases be adopted in practice, but it involves a heavy amount of labor in removing the corn crop from the ground, and time, in covering it with manure, which cannot at all times be effected in due season. The culture which experience has proved the most profitable for each of our course of crops is as follows:

INDIAN CORN.

Of the cultivated crops, this is the leading and decidedly the most important and profitable to the Delaware county farmer. Aside from the quality more or less used as food in various forms, in almost every family, it enters extensively, in as great a variety of forms, into the entire system of the farmer, furnishing in large proportion the most economical and desirable *extra* food for working-cattle, horses, beef-cattle, hogs, dairy stock, and poultry, and from the comparative certainty of obtaining a crop, under all the vicissitudes of season and accidents, it would be hazarding little to say that 50 per cent. of the entire profits of our agricultural operations (exclusive of dairying) flow directly or indirectly from the production of Indian corn alone.

In autumn, winter, or spring, old pasture ground (the older the better) is broken up, from 6 to 8 or more inches in depth, and so remains till near the planting season, when the surface is thoroughly broken with the harrow, laid off into squares, by furrows, with the plough, 4½ feet apart, and 4–5 or more grains planted with the hoe, and covered to the depth of two inches, at the intersections, between the 20th of April and the 10th of May. When the

plants are some 2 or 3 inches above ground, the cultivator is used freely in each direction between the rows, and when 6 inches high, the number of plants in each hill is reduced to 3, or at most 4. Supplying any deficiency by replanting, and stirring the surface every third week (or oftener, if the weather is dry) with the horse cultivator, until the ear sets, comprise the usual and generally the only after-culture required. The depredations of *birds*, the *wire* and *cutworms* are generally limited to the first 4 weeks after planting. The most effectual remedy for the cutworm consists in ploughing the ground during the preceding autumn or winter; for the others, none is known. Injury by moles can be in a great measure prevented by frequently stirring the ground. About the 15th of September, when the *husk* of the ear gives signs of ripeness, and the grain is *nearly* hard, the whole crop is cut off, and shocked 48 hills together, around 4 hills left standing for the purpose, and secured at the top to prevent the admission of rain. After standing thus some 3 or 4 weeks, the corn is husked and stored in open lathwork cribs, 3 feet wide, of any length and height, and covered with a water-tight roof, exposed to the open air on every side. The stalks, with the husks and leaves upon them, are bound in convenient-sized bundles, and stacked or secured under shelter, if possible, until used. The occurrence of drought or early frost frequently causes the appearance of premature ripeness in the stalk and the leaves, and the grain, though it acquires a degree of hardness, is shrunken and movable on the cob, under the finger. Experience has proved that the sap-vessels in the stalk continue to act, and, if permitted to stand, will generally mature the grain satisfactorily. Almost every known variety of corn has been introduced and cultivated here experimentally to a sufficient extent to develop their respective character and general adaptation to our soil and climate: in all cases, however, after a few years' cultivation, the effect of the latter, or, possibly, occasional contact during their growth with the cultivated varieties, tends to reduce them to a general conformity in habits, appearance, and quality, with the common standard type already in use, viz. ear from 8 to 13 inches in length, cob white, 1½ inches diameter, from 12 to 20 rows of grain, compactly seated on the cob, and weighing from 50 to 60 pounds per bushel. A yellow variety, called Oregon corn, at the Patent Office, whence the seed was received, has become a favorite with many, and its cultivation is increasing, and three varieties of white, viz. Baden, Lloyd, and Rowzie, also received from the Patent Office, have been experimented upon sufficiently to establish the character with which they came recommended; but it is questionable whether either of them offers any permanent advantages over that already in use.

The corn crop until recently has been required to depend entirely for its support on the natural fertility of the soil and stimulants derived from a fresh-turned sod. The latter is indeed an indispensable requisite for a full crop, under any system of management, or on any of our varieties of soil, however productive they may generally be. No moderate amount of manure is adequate to sustain a second consecutive crop, nor indeed a full crop from any ground under cultivation the preceding year. Light manuring *in the hill* has long been practised on small parcels with marked benefit, but the recent extension of the use of *guano* on wheat ground has enabled those using it to dispose otherwise of a portion of their barn-yard manure. Land destined for corn has recently participated in this surplus with most decided advantage, and it is highly probable that the increasing use of that article

(guano) will thoroughly revolutionize our system of manuring, and that the corn crop will eventually be the exclusive recipient of the home-made manure, as that of wheat has hitherto been. The sandy and gravelly loams on the more elevated land, distant three or more miles from the river, are better adapted to the production of this grain than the clay soil below, over nearly the whole surface of the country. However, the soil, solar heat, moisture, and length of season are so favorable to its cultivation as to produce, in average years, from 35 to 65 bushels per acre, (as the quality and natural strength of the soil may vary,) with suitable attention, *without* manuring, and a fourth or a third more if manured. The cost per bushel to the producer, when delivered at the mills, under the treatment sketched above, after making a reasonable allowance for the value of the stalks, is estimated closely at from 20 to 25 cents per bushel of 56 pounds, and the present value for new crop, 55 cents. The most recently-approved method of feeding to horses is in the whole grain; to horned cattle, in the form of meal, frequently mixed with an equal quantity of oatmeal; to hogs, the the same, after fermentation, except in the last stages of feeding for slaughter: then whole grain, and pure water for drink. Cooking the meal, and also the grain, is frequently practised on a small scale with decided advantage, but no experiments are known to have been made with sufficient accuracy to serve as data to estimate the extent of its economical advantages. The whole crop finds a ready demand at home—at the mills, factories, public houses, and dairymen, and also for feeding the large droves of beeves during their transit through our county from the South and West to the Eastern markets: in this case, it is fed in the ear, as the most advantageous and economical for the drover. The crop suffered severe injury the present year, from the violent storms of the 19th of July and later; and the great quantity of rain during the season was detrimental to crops generally, and particularly on clay soil, retarding the ripening some ten days. It escaped the frost, however, and the crop altogether is above an average one, and has been well secured.

OATS.

The oat crop, in our system, is almost invariably restricted to land cultivated with corn the previous year, and, owing to the common opinion that it is a great impoverisher of the soil, is in no great favor with the farmer. But for the small expense attending its cultivation, the convenient time of sowing and harvesting, and also the necessity for cultivating the ground preparatory to the wheat and grass crops in the succeeding autumn, which perhaps it serves well, it would be generally abandoned. Corn ground of the preceding year is ploughed at any convenient time, when the frost will permit, in the spring, not later than the 1st of May; 3 bushels of seed per acre are sown immediately, well harrowed, frequently passed over with the roller, and left without further attention, until it ripens, generally late in July, when it is cut with the cradle, bound in convenient-sized sheaves, and secured in the barn. The whole crop of 1850 was entirely prostrated by the storm on the 19th of July. Much of it could not be bound, but was stored in the barns in bulk. The quantity was about equal to an average, and the quality fair. No manure is applied to this crop: thin soil, if the season is favorable, is well adapted to this grain. On strong ground, the straw grows rank and weak, is liable to fall, and the grain perish. The crop is very susceptible of injury from drought, during any

stage of its growth, but singularly exempt from the depredations of insects or other enemies. Under favorable circumstances, from 30 to 50 bushels per acre are the usual yield, if cultivated with proper care, without strict regard to the quality of the soil. A white, and also a black variety, have been cultivated here many years, and esteemed the best adapted to our locality. The cost of production is estimated to average 21 cents per bushel: the usual value from 30 to 50 cents; at present 44 cents. The whole crop finds a ready market in the county, and is used as food for horses in the whole grain; for dairy cows and hogs, in the form of meal, usually mixed with equal parts of cornmeal.

Barley and Rye, formerly cultivated extensively here, have been superseded by oats and wheat respectively. A blight attacked the latter some fifteen years since, and has continued to affect the small quantities occasionally cultivated, except on serpentine soil; if otherwise, however, the highly improved condition of our farms renders the cultivation of wheat more profitable. The cultivation of beans and peas is restricted to the garden, exclusively for table use. Wheat is one of our standard crops, and uniformly takes its place as that last cultivated in our system previously to the grasses. The thorough working of the soil and the high manuring necessary for both of these, admitting as they do of the simultaneous introduction of their seeds, render this arrangement at once the most judicious and convenient. All our varieties of soil, when highly manured *at the time of sowing*, will produce wheat satisfactorily under favorable circumstances of season, &c. On naturally strong ground, and particularly on clay soils, a heavy growth of straw frequently proves detrimental to the crop of grain, increasing its liability to fall previous to maturity, and especially so when abundant. Rains are highly beneficial in promoting a full crop on lighter soil in more elevated situations. The favorite practice until recently has been, to manure the ground but once during the usual course of cultivation, and that *always* at the introduction of the wheat and grass crops, the last of the series. Experience has abundantly proved that manure applied to corn-ground in the spring of the year, is not sensibly beneficial to a wheat crop, if following in the autumn, though the grass crop succeeding bears evidence of the usual durability of its effects. Thus, a direct and invariable proof is furnished that the first virgin virtue of fermented manures is essential to a full development of the wheat crop; or possibly from a continued fermentation in the vicinity of the roots the necessary stimulant is drawn. Various opinions prevail in respect to the most judicious mode of applying manure to secure the best results, at once, to the wheat and the succeeding grass crops, the latter esteemed the most important; and as various methods, with this object in view. Spreading it on the surface and turning it under with the oats stubble in August, where it is suffered to remain until seeding-time, when, by reploughing, it is returned to the surface, has many advocates. Spreading it after the first ploughing, and turning it under when preparing for seeding, is also extensively practised. These are the methods generally in use, but experiments are continually being made to solve this interesting question. Observing the superior growth and yield of wheat, and the flourishing condition of grasses, on a small portion of a field, where, merely from convenience at the time, the manure was spread on the surface *after* the last ploughing, and harrowed in with the grain, the writer was induced to use the like treatment with the entire crop in 1849. The result to both the grain and

following grass crops was so highly satisfactory, that the same method has been continued with the present growing crop: the manure (from the barn-yard) was well rotted, and, together with the grain and grass seeds, mixed with the surface some two or three inches deep, by using the corn-cultivator instead of the harrow for that purpose. The present appearance of the crop warrants the opinion that both the wheat and timothy need, and are receiving, at the shallow depth to which their roots have penetrated, the greatest possible amount of benefit from the manure at this tender stage of their growth; and the inference is fair that any surplus, after supplying the wheat crop, will be much longer available to the succeeding grass than if placed at the outset at the extreme depth to which the mature roots shall penetrate. Some forty years back, a white, beardless variety of wheat, called "Jones," after enjoying exclusively the favor of farmers of that day, ceased to yield satisfactorily, and was discarded. A variety, still cultivated by a few—the "red-chaff bearded"—supplied its place, and continued without a rival until some fifteen years since, when its productiveness began to fail. It also fell into disrepute, and gave place to almost every known variety of winter wheat, which by turns succeeded each other, and had their year of eclat, to pass into oblivion as their predecessors. The "Chinese," "blue-stem," "Genessee," "Henderson," "Stewart," "Mountain," and "Mediterranean," have each walked over the course, and, except the two last, have nearly disappeared. The "Mountain," introduced about the year 1844, soon led to high hopes of its adaptation to our locality. The first, second, and third years of its general use, it succeeded to admiration; but last, and the preceding year, owing to its late ripening, (about the 10th of July,) it was struck with mildew, and simultaneously attacked, while in the milk, by a small, wormlike, reddish insect, whose depredations on the grain almost literally annihilated the entire crop of that variety, in a large portion of the county, and, with it, its former popularity. The "Mediterranean," introduced some twelve years since, has become a steady dependence under all vicissitudes. Its exemption from the "fly" served at once to extend its fame—a character which, unfortunately, departed early. Yet, notwithstanding the fancy article above-named passed over the scene in the mean time, its comparative excellence, by contrast with them, is more thoroughly appreciated, and at this moment it reigns in public estimation without a peer. Its good qualities consist in admitting of early or late sowing, more productive than other varieties on thin soil, early ripening, (about 10 days in advance of other kinds,) by which rust and mildew are nearly uniformly escaped: it probably escaped the ravages of the insect described above for the same reason. Flour, white and excellent; grain, large and full, weighing from 60 to 65 lbs. per bushel. The objection urged against it is the weakness of the straw, which causes it to fall occasionally, on very fertile land, before perfectly ripe, and renders the harvesting troublesome and expensive. Various modes of preparing the seed have from time to time been recommended, and in some instances practised, such as soaking in ley of wood-ashes, lime-water, salt-water, &c., but no advantages have resulted to induce a continuance: the only caution observed is to select the fairest portion of the recent crop, clear of blight, and to thoroughly separate any extraneous substance. The main dependence is placed in the preparation of the ground rather than that of the seed. In very rare instances, and these as a matter of convenience, wheat is sown on small lots of fresh-turned sod, and frequently on ground from which a potato crop has been removed, in both instances with

moderate success; but the usual course, as before given, consists in preparing recent oats-ground, by some of the modes described, by mixing thoroughly with the soil from 25 to 30 ox-cart loads of stable manure, or 400 lbs. of guano per acre; then sow, broadcast, from 7 to 9 pecks of seed, harrow the surface thoroughly, and sow from 4 to 6 qts. of timothy-seed, immediately before rain. On flat ground, inclining to clay, covering the grain by light ploughing is frequently practised with advantage.

When the drill is used, from 5 to 7 pecks of seed per acre are deemed sufficient. The corn-cultivator is, in some instances, used for covering the grain, instead of the plough, harrow, or drill, as the condition of the soil or surface may render preferable. In all cases where guano is used, the plough is preferred, to prevent, as far as possible, its contact with the atmosphere. The usual time for sowing embraces the last 20 days of September and the first 20 days of October. The advantages of any time intermediate are wholly dependent on the after state of the season. When very dry, the early sown is attacked by the Hessian fly, and the check it receives from this and the lack of moisture is seldom entirely overcome. The principal advantage of early sowing consists in the opportunity afforded to the timothy to acquire sufficient root to resist the injury inflicted by alternate freezing and thawing during the ensuing winter: it is the more important crop, and very susceptible of damage from this cause. If the autumn continues mild and moist, with but little early freezing, that sown so late as the middle of October, or even later, frequently produces the heaviest crop, and but a few days difference in the time of ripening is observed to result from as many weeks difference in the time of sowing. The Mediterranean ripens usually about the first of July; other varieties, about the 10th. When harvested, the crop is stored in barns, and recently the threshing-machine is employed, as early as convenient, to anticipate the usual depredations of rats and mice. The crop of 1850, up to the middle of June, progressed favorably; but the constant humidity of the air and the large quantity of rain caused rust and mildew to attack all late varieties. This, in connection with the destruction by the unknown insect referred to, reduced the entire yield some 20 per cent. below our usual average. The whole crop of the county but partially supplies the local consumption, and finds a ready market at our mills, at Philadelphia prices ranging from $1.25 in August, to $1.04–$1.10 subsequently. The general yield of wheat per acre is progressively increasing in this county, owing to the constantly improving condition of the soil. From 15 to 20 bushels per acre, twenty-five years ago, was deemed a full crop, on our best soils. Under our improved system of cultivation, and greater attention to liming and manuring, less than from 25 to 30 bushels, on like soils, in favorable seasons, is not satisfactory. About that time, wheat had become an exceedingly uncertain crop, by the constantly increasing injury inflicted by the Hessian fly. The old "red chaff" was almost the only variety then in use, and generally sown early. The fly became so destructive as almost to deter farmers from further attempts to cultivate wheat. It was found, however, that, by late sowing, say from the middle to the last of October, for a number of years, it almost disappeared from the county; but that variety of wheat ceasing to yield satisfactorily, other more productive kinds were introduced, and they were proved to be most prolific when sown from two to four weeks earlier. The "Mediterranean" was one of these, the first; then followed the "mountain" and others, all of which escaped the fly for a time, even when thus early sown: they were consequently deemed fly-proof.

The usual time of sowing was anticipated, in many instances, to the last week of August. The fly has returned again, and they attack indiscriminately every variety, thus inducing the belief that the previous exemption from the ravages was not owing to the kinds of wheat in use, but to *their absence*. Reflecting farmers are of opinion that their return is consequent upon very early sowing, and that the only relief will be found in a return to that practice which formerly proved effectual. The *weevil* is not known to us as a scourge to the growing crop. They frequently infest barns and mills. The remedy for the farmer is easy, and consists in stacking at a distance for about three successive years, and they entirely disappear. Our last crop, particularly the late-ripening varieties, and especially the "mountain," were attacked by a little reddish-yellow worm in the grain, *while in the milk*, and the destruction, in many instances, was almost complete. Its ravages were at an end when the grain became hard; and it was probably owing to the grains of the "Mediterranean" being in this situation when it made its appearance, that it alone escaped. This insect was called by some the "red weevil;" but it had none of the appearances nor characteristics of a weevil. It came with the mildew. Under the microscope, no legs were discoverable, nor any thing like a mouth for biting, but only for sucking; nothing like teeth, or any thing calculated to answer their purpose, could be discovered: the organ reminded every one who thus examined them of the mouth of the fish called sucker; hence they cannot be classed with the weevil family. From 10 to 50 were to be found in each head of wheat; often a dozen in the same pod. The number was so great, that the floors of the wagons and the barns, when storing the crop, bore the appearance of being covered with red dust. They continued to live, without sensible alteration in appearance, or further injury, many weeks. Their presence in the former crop is supposed from a similarity of its general appearance and light yield, attributed, at the time, to mildew alone; but they were not noticed. They are strangers to us, and no remedy for their ravages is known, save in sowing the earliest ripening varieties, and hence but little other than the "Mediterranean" was sown last fall.

CLOVER AND GRASSES.

The paramount importance of our grass crops, and the necessity for stirring the soil, at intervals of not exceeding 6 or 7 years, to insure the greatest aggregate yield, are the inducements to pursue as short a rotation of cultivation of the cereals as is found compatible with this main object. A three-years course of corn, oats, and wheat, has been reluctantly adopted as serving the desired purpose, and admitting of a convenient distribution of the farming operations equally throughout the business season. A most desirable modification would be effected if the wheat crop would admit of following that of corn directly, in the same year, with safety to it and the grasses, without an intervening oat crop. The principal difficulty to be removed is the additional labor and time necessary to haul and spread some 25 to 40 loads of manure per acre, after the heavy work of removing the corn from the ground, the commencement of which is not usually earlier than the 12th or 18th of September, thus delaying the *act* of *sowing* beyond a safe season for either grain or grass seed, particularly the latter. The well-established necessity for the application of manure, in some form, *at the time of sowing these seeds*, has, hitherto, rendered this large expenditure

of labor and time essential conditions of such modification. It is now believed that the use of guano as a substitute for stable-manure may enable our farmers to make this desirable change without unusual risk to the after crops; some progress has already been made in its support. Guano, in quantities of from 300 to 400 pounds per acre, has been used frequently within the last 3 or 4 years, instead of stable-manure, on wheat ground, with effects entirely equal in benefit to that and the succeeding grasses. In a few instances, when sown very late, and particularly after the removal of corn, uniform success has resulted. If no serious objection shall present itself in further practice, and the hope entertained from this partial experience be realized, the stable-manure may be applied to the corn-ground in the spring, by which its ripening season will be accelerated some 10 days, to be followed in the fall by wheat and timothy, treated with a light dressing of guano, *in good season* for the security of both: the oat crop omitted and a return to grass crops, at the end of the second instead of the third year, as heretofore. Timothy and clover (together) are the grasses cultivated for hay and pasture, nearly to the exclusion of all others. Herd and orchard grasses are, in a very few instances, cultivated in orchards and moist situations, but the difficulty of eradicating them when desired is a serious objection to their use. The treatment of timothy has been noticed:—that of clover consists in merely sowing from 4 to 6 quarts per acre of seed, on the growing wheat-ground, in the month of March or early in April, after severe freezing has passed; the surface at this time, in drying after winter frosts, is divided into numerous small fissures, into which a portion of the seeds falls and takes root at once, thus receiving the necessary moisture, and protection from frosts and the drying winds usual at that season. If the weather continues dry after the wheat has been removed, both the timothy and the clover will languish, and care is required that they shall be protected from close pasturing—if wet, a heavy growth will follow, and admit of pasturing freely. In the following year, the proportion of the clover to the timothy will be larger than is desired for first-quality hay, and is frequently devoted to pasturage; the second and succeeding years, the relative proportion changes, until about the fourth, when the clover will have nearly disappeared, and the timothy be no longer in quantity to furnish a satisfactory crop of hay: it is then appropriated to pasturing stock until reploughed for corn. The production of these grasses, and particularly clover, may be greatly promoted, and the latter in moderate quantity indefinitely continued, by occasionally top-dressing them with about one bushel of plaster per acre, say every second year. The chief dependence of the farmers of this county for winter support for the comparatively large farm and dairy stocks, everywhere kept in number up to the extreme limit of subsistence, is on the clover and timothy hay thus produced, assisted as far as possible by that procured from natural meadows, corn-fodder, straw, &c. Previously to the introduction of clover and timothy, about the commencement of the present century, and within the recollection of our old farmers, the only supply of hay was limited to that procured from natural meadows, watered by the overflow of streams or by irrigation: hence the value of farms bore a close proportion to the quantity of such land on each: those destitute of such a resource were esteemed of little comparative value, having been already exhausted by continued cropping, and no means of resuscitation could be drawn from the soil. Necessity thus induced a resort to mineral substitutes: lime and plaster were applied, at first cautiously and hesitatingly, subsequently in profusion;

and, at this day, *uplands*, with the assistance of home-made manures thus produced, are made as productive in grass as the best meadow-lands, and full crops of the cereals are obtained. In the course of the necessary preparation, no attention is required to natural meadows, except to regulate the flow of water when irrigated, and, when the utmost possible amount of hay is desired, to avoid pasturing them at any time. The quantity of fertilizing matter deposited from the overflow will fully sustain the constant cropping, and, with care, will largely increase the productiveness: leached ashes is found to be the best known top-dressing for portions not within the reach of water, and plaster on every part has proved highly beneficial. The quantity of clover and timothy (mixed) hay, produced as above, will vary from 1 to 3 tons per acre, as the soil and season may be adverse or favorable, and estimated to average, in a series of years, 1½ tons annually, from all cultivated and meadow ground: from the former, in one crop harvested from the 20th of June to the 10th of July; from the latter, in two crops—the first from the 15th to the 30th of June, the last in September. The late crop, (1850,) owing to the great abundance of rain and high temperature during the growing season, is believed to be equal to the largest ever produced in the county; and, as a consequence, the market value is about 20 per cent. below the average, say from $10 to $12 per ton at the close of the year. Timothy produces but one crop of seed or hay annually: the seed ripens about the 20th of July, and is harvested as wheat. The growth of clover is continued throughout the season: the seed is procured from the second crop, permitted to ripen late in August or in September. As pasture, timothy is highly relished by all kinds of farm-stock—clover is a great favorite with horses and hogs, but becomes loathsome to horned cattle if confined to it even for a few days; when depastured in connection with the natural grasses, and free access is permitted to either at will, its full value is realized. There is difficulty in arriving at a correct estimate of the cost of growing hay per ton, on upland, since it would necessarily include a portion of the expense and value of the manure applied to the preceding grain crops. Apart from these, however, the cost would be limited to the interest on the value of the ground, taxes, &c., and the expense of securing, amounting together to about $8 per acre, or $5.40 per ton, on upland, and $9 per acre, or $6 per ton, for meadows, the latter including two separate crops.

After the second or third year's crops of clover and timothy hay have been taken the diminution in quantity progresses rapidly, and its place is supplied with like rapidity by a spontaneous growth of white clover and green grass. These grasses furnish the most grateful food in the form of pasture and hay to all kinds of stock, and are estimated more valuable for beef or dairy cattle than any other known to us; the growth is rapid when moisture is abundant, but they languish in drought, owing to the slight depth penetrated by the roots. The clover is said to be an introduced grass—when, or by whom we are unable to say; the yield of seed is large, but none is secured. Every part of our land is charged with it, and to whatever length of time cultivation may be continued, when permitted to rest white clover will make its appearance at once, and, in the space of two or three years these grasses occupy the ground, to the exclusion of nearly every other. Their productiveness is greatly promoted by top-dressings of plaster, wood ashes, and other manures. At the end of 6 or 7 years from the previous ploughing, the surface becomes hardened by the feet of cattle, in common parlance "sod-bound," and the regular course of cropping is repeated

ROOT CROPS.

Turnips, Carrots, Beets.—Turnips are grown in small quantities, for table use alone; generally sown in gardens and borders of cornfields late in July or early in August, when the corn needs no further work upon it. The crop is a precarious one, and frequently fails from partial drought. Ashes, rubbish from the wood-yard, and other refuse and rich earth were, until recently, the usual manures applied. A few recent experiments with guano have proved it to be incomparably superior to any other for this crop, and it is probable further trial may induce greater attention to it.

Carrots and beets are also produced in small quantities for table use. Some ten years since, a spirited attempt was made to introduce sugar-beet as a standard crop. Their cultivation was attended with success in almost every instance, and their value as food for cattle and hogs was generally admitted. The yield was from 400 to 800 bushels per acre in field culture, but ripening too late in the season to be succeeded by wheat and grass without interfering with other important operations on the farm was an objection, and but few are now to be seen in the country. As winter food for store hogs they are preferable to grain, and their cost less than one-third. The usual practice was to plant in ground suitable for potatoes, laid off by furrows 18 inches apart, treated with a moderate quantity of well-rotted manure on very rich earth, two or three seeds deposited together at 6 inches distance, and covered with the hoe; when the plants are some 3 or 4 inches above ground, thin out, leaving one only; as their growth progresses, feed off every second beet, and leave the number to ripen 12 by 18 inches. The season for planting and harvesting, and also the treatment throughout, are similar to that of the garden beet. The usual way of preservation in winter is the same as potatoes. When fed to hogs, no preparation is necessary; to cattle, they are required to be washed clean, cut into pieces, and, when desired, dusted with any kind of meal. When fermenting manure is used, cover it two inches deep with earth, then plant and cover again. When fed to horned cattle, owing to its slight purgative quality, a simultaneous use of hay, straw or corn fodder is required.

Potatoes, Common and Sweet.—The common potato is cultivated in this county to the extent of consumption, and, in the eastern section, for the Philadelphia market. The planting season is from the 10th of March to the 1st of June. Early planting, say from the 10th to the last of April, has been generally preferred since the prevalence of the "rot;" by admitting of harvesting previous to the usual copious rains late in September, loss by that disease has been to a good degree avoided. Late planting, when the months of July and August are wet, succeeds well, and, before the appearance of that disease, was chiefly practised for a winter supply. Apparently, owing to the unusually large quantity of rain in the months of July, August, and September, in 1850, the early planted crop was backward and the quality indifferent. The disease became very prevalent in September, and continued, causing a heavy loss. After being gathered and stored, they were attacked by another disease called "black rot," for which no remedy is known. When stored in confined cellars, its progress was rapid and destructive, and the quantity left by both diseases is small and the quality very inferior. Altogether, this season has been more disastrous to this crop than any since 1846. The latter disease was observed imme-

diately after the potatoes were stored away, presenting a slightly shrivelled skin and numerous small specks of white fungi on the part affected under the skin; the substance became slightly hardened and of a dark brown-color; thus it progressed till the whole was destroyed and dry. No evidence is afforded of the disease being communicated to another by contact, but the inferior quality of all favors the opinion that none are in a strictly healthy condition. The usual cultivation consists in spreading about 40 cart-loads of slightly fermented stable manure upon an acre of *sod* ground, (if convenient,) or that cultivated the previous year with corn or oats, at any time in the spring. For planting, plough the field as usual, and drop the potatoes 8 or 9 inches apart in every second furrow; harrow the surface, or permit it to remain until the plants are some 4 or 5 inches high, when the surface is thoroughly broken by the harrow, without regard to the tops; before the tops fall, pass the corn-cultivator freely between the rows until all grass and weeds are destroyed; if the surface is flat or inclined to clay, throw a light ridge on each side with the plough: proper care afterwards to prevent the growth of weeds, &c. is all the attention required until the crop is ready for gathering. The manure, in some instances, is placed in the furrows under the potato as the planting proceeds, but with no visible advantage. Soil inclined to sandy is esteemed preferable for this crop, and it is less liable to suffer from disease. About 500 lbs. of guano are found to equal the usual quantity of manure, and its use for this purpose is increasing. Lime also is much used, and is believed by many to improve the quality of the potato sensibly. No preparation of the seed is practised beyond reducing to the proper size, if too large; but small tubers about 16 to the pound are generally used whole, and preferred by many to large ones divided. The "Mercers" are cultivated almost to the exclusion of all others; some of the latter are occasionally introduced and tried, but none are found to be preferable, and soon disappear. The average of our crops for a series of years may be placed at 100 bushels per acre. In favorable seasons and soil, 150 bushels are obtained, but it is doubtful whether there is any progressive increase since the "rot" made its attack in 1843, or that by the present practice any very material increase in the product per acre can be obtained. The writer of this, a few years since, made an experiment to test the capacity of ground equally manured, to produce potatoes when planted in rows at less than the usual distance apart. On one-fifth of an acre, eight cart-loads of manure were spread in the usual way on the sod; one-third was planted with potatoes in every third furrow; one-third in every second furrow, and the remaining third in every furrow, at the distance of 9 inches apart in the furrows; dressing the crop was performed in the usual manner until it required the last culture; the last third received a thorough dressing with the hoe, and the others with the plough. The result was 60 bushels of prime potatoes, exclusive of small ones, or about 300 bushels per acre. The product of every row was measured separately, and the average found to be the same. Thus proving, in this instance, that ground equally manured will produce one-third more if planted two feet apart, or two-thirds more if planted one foot apart, than if at the usual distance of three feet; in other words, three bushels if planted in every furrow, to one bushel if in every third furrow, as is the present practice, with only the additional cost of seed and extra labor of the last dressing with the hoe, when planted so close as to yield the greatest quantity. The present year, (1850,) the most unfavorable of many years past for the potato crop, from 1⅔ acres of ground,

273 bushels of potatoes, large and small, were gathered, grown in rows two feet apart; usual cost of production estimated at 36 cents per bushel.

FRUIT CULTURE.

Considerable attention is given to the varieties of fruit suitable for table use at home, and for the Philadelphia market. These include apples, pears, peaches, plums, cherries, and grapes: apples are grown in quantities sufficient to meet those demands; but the more profitable use of the land for other purposes restricts the orchards to a few acres. None are cultivated for exportation. Much care has been recently observed in selecting the most valuable varieties and in their management: proper trimming, and yearly washing the bodies and principal branches with soft-soap, mixed with a solution of saltpetre, and also the removal of the earth, 6 inches deep and three feet in diameter, from the stem of the trees, and occasionally *ploughing the soil*, is the usual and necessary treatment practised. A white worm, infesting the body at and below the surface of the ground, is the great enemy to the apple-tree. Its seat is believed to be in, and its presence owing to the wound inflicted in grafting: it generally manages, with all our care, to produce premature decay and death to the tree. The only known remedy practised is to expose the part attacked to the frosts of winter. Hogs and cattle thrive well on the fruit when green, in connection with other food; but the unlimited use by dairy-cows, in some instances, almost suspends the secretion of milk, destroys their appetite, or deprives them of the power of eating other food, and nearly paralyzes their legs and feet. Horses become fat in a very short time when permitted to range in the orchard. For winter feeding, they are very nutritious, and relished by all kinds of stock, but no experiments are known to test their comparative value with potatoes. Our locality is well adapted to the pear-tree, and by quite spirited exertions we continue to avail ourselves of the advantage. The new and choice foreign varieties have been added to our former catalogue, with a fair prospect of success: a solitary instance of the blight, with the supposed cause and remedy, will exhibit in a nutshell the result of general experience. A young pear-tree, growing in a grass-sod, near the dwelling-house, bore fruit abundantly from an early age until 1842. It was then included in a newly located garden; the grass-sod was permitted to remain some 20 feet in diameter, under the tree; until 1844, the tree continued healthy and fruitful as before; in that year, the sod was removed and the ground cultivated; one of the principal branches was blasted the same year. The following year, the tree was fruitless for the first time, and wore a general sickly appearance, with a few small blasted branches. The greater exposure of the roots to the vicissitudes of extreme heat and cold was the supposed cause, and the surface was again covered with the sod; the tree recovered slowly, and has since become healthy and very prolific; other trees near it, but not included in the garden, have continued uniformly healthy and fruitful: the soil is a rich sandy loam; the situation, a south-eastern exposure, inclined at an angle of about 5 degrees. Peaches are cultivated for market in moderate quantity, with about the usual success. The trees are uniformly attacked at an early age by the worm, in the stem at the surface of the ground. Many devices have been put in requisition as preventives: exposure of the parts to winter frosts, a bank of earth around the stem during summer and removed in winter, straw-covering for

the stem, white-washing, ashes, tan, salt, lime, &c., around the stem at the roots: all, however, have alike failed to preserve the tree, beyond the sixth or seventh year. The yellows also performs a full share in the destruction, for which no remedy or palliative is known. The past 20 years have witnessed the introduction of many excellent varieties of plums, but their cultivation is discouraging; the fruit is frequently attacked when nearly full-grown, by the "black rot," and perishes before maturity. This disease varies in intensity in different seasons, but comparatively few escape at any time. The injury inflicted by an insect on the branches has almost annihilated it in many localities. Some 12 years since, the writer was surprised by a few of the unsightly blotches on his young trees, but strict vigilance in removing them on their first appearance during 2 or 3 years was sufficient to destroy them; none have since appeared, notwithstanding at the distance of one-third of a mile many trees continue to be disfigured by them. Cherries are numbered among the valuable fruits that flourish in this county with complete success, and almost without an enemy. Many of the most excellent varieties known have been introduced, and succeed to entire satisfaction in situations elevated 80 feet or more above the creek valleys: cherries are also, in common with pears, found to succeed best where the earth near and under the trees is permitted to remain uncultivated. Grapes, suitable for table use, have within the last 20 years obtained a place in almost every garden in the county: some of the more delicate varieties are cultivated under glass, but generally those more hardy and native to our climate are preferred: among which the Catawba, Isabella, and Schuylkill are the favorites. These, when the season is moderately dry, ripen satisfactorily; when otherwise, they scarcely arrive at maturity before being overtaken by early frost; this was especially the case the present year, (1850.) All kinds also suffered seriously from the rot: the Catawba least, and the Isabella to the greatest extent here, as elsewhere. We perceive no remedy is known, and fears are entertained, from its progressive increase, that at no distant time we shall be deprived of the enjoyment of this delicious fruit. Its appearance has not been noticed in the wild-grapes in the forest, and a few choice kinds transplanted into our gardens, though greatly improved, have thus far escaped. No wine, except for family use, is made in the county. The preceding includes all articles of field-culture with us, and the processes, application of manures, &c., in general practice. But few particular instances have been given, for the reason that in the anxiety to make the most profitable use of every discovery or improvement, they are, when established, at once adopted into our system, and their influence mingled in producing the results given under the foregoing heads respectively.

MANURES.

The improvement of the soil is progressing by every practicable means throughout the eastern counties of this State. In this county it is, beyond all other considerations, the leading object of the agriculturist. Every fertilizing agent in reach is put in requisition for that ultimate purpose; lime, plaster, bone-dust, poudrette, and guano, are each, to a greater or less extent, drawn upon as aids to the large quantities of domestic manures made at our barns, stables, hog-pens, &c. Lime is used indiscriminately on all kinds of soil in this county, with decided advantage; nearly the whole of our arable

land has been treated within the last 25 years, with liberal dressings of from 50 to 100 bushels per acre, and much of it repeatedly. The form of applying it is merely to slake and spread it as nearly uniform as possible over the surface, either of sod or broken ground, at any season of the year, or in any quantity desired. In every instance its effects are immediate, decided, and permanent. The opinion has many advocates, that, while it continues in the forms of caustic and hydrate, its energies are much more active as a fertilizer, than after its return to that of a carbonate; hence, that dressings of 30 to 40 bushels per acre, repeated periodically at the end of 8 or 10 years, are preferable to a larger quantity at longer periods. Plaster is used extensively as a top-dressing on grass grounds, in quantity from 1 to 2 bushels per acre. Its advantages on clay soils are not so decidedly marked as on others. The benefit received by all the grasses, and particularly clover, is at once evident after copious rain, and is continued, at least to the fourth year. An increase of one-third in the quantity of clover, and a fourth in that of the native grasses, together with earlier and later vegetation, and their uniform deep-green color, are the common proofs of its value on the sandy and gravelly loams of this county. It is also used extensively on the young plants of Indian corn, but by many its benefit in this case is doubted. Bone-dust and poudrette have also been used to some extent, the former with entirely satisfactory results: spread over or mixed with the soil in the course of cultivation, the benefit received from it is immediate and lasting. Their use, however, has been checked by the recent introduction of guano, which, from the high character it has already acquired as a fertilizer of the soil in every form and under all conditions, promises fair to withdraw attention from these, if, indeed, it shall not materially diminish the usual exertions in accumulating the ordinary stock of domestic manure. It is probably too early to pronounce definitely upon its relative value, in comparison with the mineral and vegetable resources thus far relied upon, and which have changed many large districts of our previously exhausted Atlantic border to a highly productive condition, within the recollection and under the persevering industry of the present generation. But that it will form an important epoch in our agricultural history, the brief experience already had leaves no room to doubt. The most judicious form and mode of applying it are yet the subject of experiment, and opinion is not yet established on this interesting point. The volatility of its fertilizing properties has, however, suggested the necessity of mixing or covering *at once* with the soil, and this is the present practice. To secure uniformity in spreading, it is previously pulverized finely, and mixed in any proportion with plaster, fine earth, &c., and spread with the hand; plaster is preferred by many under the impression that a portion of the volatile salt becomes thus fixed and secured from loss, while it is otherwise well suited to the purpose. Plaster, in the proportion of 1 peck to the bushel of guano is generally used; some experiments go to show that *ashes* wholly neutralize its volatile qualities, and that lime does so partially. On corn, oats, wheat, turnips, potatoes, carrots, and the succeeding grass crops, its effect is immediate and highly satisfactory. On all our soils, and particularly on thin and those exhausted by long cropping, its productive energy, when used to the extent of 300 to 500 pounds per acre, is equal to a heavy dressing of stable manure. Its use is increasing rapidly, notwithstanding the price has advanced 50 per cent. since its first introduction. The importance of securing the largest possible quantity of domestic manure, as the most reliable source of agricultural prosperity, is

well understood here, and every convenient means is resorted to, to effect it: all refuse vegetable matter is collected and deposited in the cattle-yards and hog-pens; earth from ditches, hedges, &c. is frequently used to pave the yards, stables, and pens, where it remains through the winter, to absorb the urine and other valuable liquids. The corn roots with the earth adhering to them, after the removal of the corn crop, are in many instances used for the same purpose. The whole of these, when the manure in the yards is turned and heaped in the following spring, are mixed with it, and form a covering to protect it from exposure to the weather, and to imbibe the volatile matter thrown out in the process of fermentation, and thus acquire a value equal to the vegetable matter with which they had been associated. The manure heaps thus protected remain until fermentation has ceased, and until the land intended for a wheat crop is prepared to receive it. When convenient, the manure is kept under sheds or other shelter, and is esteemed one-third more valuable than if exposed to the weather.

METEOROLOGY.

The state of the weather, throughout the year 1850, has been the most favorable, in this region, for the agricultural interests, within our recollection. The quantity of rain was abundant, and distributed in suitable quantity and time for every growing crop, except potatoes, which are believed to have suffered from the excess. Under the influence of abundant moisture, accompanied by high temperature and unusual electric disturbance, vegetation was impelled to an extent rarely witnessed, if indeed it has ever been exceeded; a brief suspension of rains occurred very opportunely at harvest and seeding-time, but was not productive of serious check to vegetation, owing to the large quantity of moisture previously collected in the soil. The violent storm on the 19th of July almost entirely prostrated the oats and corn crops. The former partially, and the latter satisfactorily recovered from its effects, without serious loss, except additional expense in harvesting the oats. The loss of life and property occasioned by the lightning was large beyond precedent, and its frequency and severity without a parallel. The months of October and November were mild and comparatively dry, and the farmer was enabled to close his out-door operations in good season, without obstruction from frost or wet.

The accompanying table has been prepared from the meteorological journal kept for our Institution, and is believed to conform to your "suggestions," and may embrace all that is interesting to the agriculturist.

Meteorological Table for 1850, *at North Latitude* 39° 55′ 18″, *Longitude* 1° 36′ 10″ *East from Washington City.—Elevated* 175 *feet above tide-level.*

	Mean monthly Temperature by Fahrenheit. Thermometer changed every observation, to avoid reflected heat, at the following hours, daily.									Monthly mean temperature at 6 observations daily.	Atmospheric Pressure.				Number of Days.					Inches of rain and melted snow.	Prevailing Winds during the greatest number of hours in each day.								
	Sunrise.	9 A. M.	12 M.	3 P. M.	Sunset.	9 P. M.	Highest.	Lowest.	Range.		Monthly mean of Barometer.	Highest Ascent.	Lowest Descent.	Range.	Cloudy weather prevailed on.	Thunder and lightning on.	Aurora borealis.	Rain fell on.	Snow fell on.		N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.	Calm.
1850	°	°	°	°	°	°	°	°	°	°																		
Jan.	29.35	34.29	39.25	39.	35.84	34.19	58	9	49	35.32	30.11	30.57	29.47	1.10	22		4	11	6	4.52	5	3	11	3		1		7	1
Feb.	29.68	35.	40.82	42.10	36.96	30.31	58	11	47	35.81	29.97	30.73	29.18	1.55	12	1	1	7		4.14	7	2	4	3	2	5	1	4	
March	31.58	38.16	42.51	42.73	40.90	36.20	67	17	50	38.68	29.95	30.40	29.16	1.24	15		6	14	6	4.47	12	3	8	2	2			4	
April	37.30	46.53	52.43	53.10	47.	42.86	73	26	47	46.53	29.98	30.31	29.30	1.01	19	1	2	11	2	2.69	6	3	3	3	4	3	4	4	
May	47.	58.67	63.	62.61	56.22	53.	80	31	49	56.75	29.92	30.31	29.44	.87	15	6	2	16		5.56	6	6	3	5	1	4	3	3	
June	60.01	71.40	78.32	79.38	62.36	66.71	88	46	42	69.79	30.06	30.37	29.70	.67	12	11		9		3.47	4	3	5	3	4	3	5	3	
July	67.29	77.67	82.87	82.54	74.20	73.16	90	49	41	76.29	30.02	30.20	29.37	.83	15	9	1	11		6.29	4	2	5	7	3	2	4	4	
Aug.	63.96	70.69	76.09	77.42	67.87	67.42	87	51	36	70.62	30.02	30.30	29.50	.80	16	12		14		6.81	6	3	8	1	2	4	6	1	
Sept.	55.96	65.01	69.50	71.03	63.23	59.88	82	40	42	63.93	30.06	30.36	29.79	.57	10	6	2	9		7.57	6	2	9	1	6	5	1		
Oct.	43.16	52.74	59.10	60.33	53.70	48.29	73	24	47	52.88	29.92	30.24	29.34	.90	11	5	1	9		.97	9	3	3	2	2	4	7	1	
Nov.	40.23	45.70	50.90	52.	47.63	43.20	71	24	47	46.61	30.05	30.31	29.68	.63	16		1	8		2.65	5	5	6		3	3	5	2	
Dec.	29.96	33.51	37.84	38.	35.25	32.87	54	12	42	34.84	30.02	30.55	28.90	1.65	18			12	5	4.65	6	4	7	3	1	2	5	3	
Yearly Mean	44.62	52.47	57.72	58.27	51.76	49.	90	9		52.30	30.07			1.83	181	51	20	131	19	53.79	76	39	72	33	30	36	41	36	1
															Total number in the year.													

DAIRY HUSBANDRY

Engages the attention, directly and indirectly, of a large portion of our population, and the high character of the produce, and particularly of butter, in the New York, Baltimore, and Philadelphia markets, sufficiently attests not only a judicious discrimination in the choice of stock and their general management, but intimate knowledge of the most approved method in the delicate operations of its manufacture. In the selection of cows for the dairy, (almost exclusively from those driven into this county from the midland districts of this State,) preference is usually given to fair specimens of our native breeds over any pure blood or cross of imported stock. A stock thus selected, dry and comfortable shelter, a sufficiency of good hay and corn fodder, in the winter, with about 6 or 8 quarts of wheat bran, or its equivalent in corn and oat-meal per day, when in milk, free access to water, and general cleanliness, are the necessary preliminaries to a successful year's operation in the business of dairying. The usual management in a well-conducted dairy is nearly as follows, viz. :—At four or five weeks old the calves are slaughtered and the process of butter-making commences. The cows are milked in the morning and evening, and the milk strained at once into pans from 4 to 6 quarts each, and placed in a well-aired milk-house, in water, to the depth of 4 or 5 inches, at a temperature of about 52° Fahrenheit, there to remain *but* 36 *hours*, until the cream is separated. If the cream will not "ripen" in that time, the process should be accelerated by the addition of milk previously soured, to be placed in the pans previous to their receiving the new milk, that the latter shall become thickened at the end of that time, and the cream removed. If permitted to remain in contact with the milk longer than 36 hours, that peculiar sweetness and freshness which characterize Delaware county butter will almost invariably be destroyed. Great care is required in separating the cream from the milk, to prevent, if possible, even the smallest quantity of milk from passing into the cream-cans. These cans should contain about from 4 to 5 gallons, and when filled, placed in water as deep as they will stand steady, and their contents stirred twice daily. The cream should be churned at the end of three or four days at farthest, in a revolving churn, without stoppage during the process, or permitting the escape of the accumulating gas. The temperature should not vary much from 60° Fahrenheit, nor the process be completed in less than 30 or more than 60 minutes. The desired time can be very nearly attained by close attention to the temperature of the cream and to the velocity of the churn. When the butter has gathered to the size of peas, the churning should cease, the butter-milk be withdrawn, and about one-fourth the quantity of clear, cold water returned into the churn. After 3 or 4 turns, draw off the water, and return one half the quantity, as before, and repeat a few turns of the churn. Drain the water well off by a few direct and reversed motions of the churn. Add fine, clean Liverpool salt, at the rate of 11 oz. to 30 lbs. of butter, or, which is nearly equivalent, to 30 quarts of good cream put in the churn. Turn the churn 3 or 4 rounds, and reverse, and the butter will be thoroughly salted for use *while fresh*. It should remain in the churn in this condition for half an hour, that the salt may all be dissolved, when it will be ready for working and sponging. The operation of freeing it from moisture is performed by placing it, when taken from the churn, on a table with a lever attached, and pressing and turning it frequently, using a sponge covered with a cloth, to absorb the moisture, till no

more appears, when it will be ready for weighing and printing in any desired form. The most material points in the manufacture of butter are, first, that, to secure the maximum quantity without injury to the quality, *the cream shall be separated from the milk at the end of* 36 *hours;* secondly, that the cream in the cans shall be kept at a temperature of about 52°, and stirred twice in 24 hours; thirdly, that, in the process of churning, *gas or air generated in the course of the operation shall not be permitted to escape from the churn.* It is believed to contain all the rich aroma of the cream, and by thus confining it in contact, it is imbibed by the butter while forming. In summer-feeding dairy stock, a principal object is to induce the cows to eat the largest quantity compatible with full health. This is most readily accomplished by frequent change of pasture, with free access to water and salt. The natural grasses furnish the most grateful and richest pasture, and produce the best quality of butter. Clover, as has been said, is relished by horned cattle but for a short time only, if confined to it; but when allowed to range at will in it and natural grasses together, its full value as pasture is realized. The annual production of butter per head, in our dairies, fluctuates, with the abundance or scarcity of summer pasture, from 125 to 150 lbs., and occasionally something above these numbers. The quantity produced the present year (1850) has been above the average, if not the very highest. In a few instances, above 200 lbs. have been obtained from small dairies of choice cows. These instances occur, however, under extraordinary care and cost, but may nevertheless furnish valuable hints to the dairyman. The value of fresh butter in Philadelphia market varies, during the season, from 16 to 40 cents per lb., and will average 25 cents or upwards for all qualities. The cost of butter to the producer, interlaced as it is with our entire system of agricultural operations, cannot even be approximated, and we are deterred from the attempt. No cheese is made at our dairies. The sour milk is fed to hogs, and estimated to produce 80 lbs. of pork for each cow in the dairy. The average value of calves is about $5 at 4 or 5 weeks old.

Neat Cattle.—But few of these are raised in this county. The more directly profitable application of provisions when fed to dairy cows induces a dependence for recruiting their numbers on those driven from districts in this State north and west of us, not in convenient reach of a market for fresh butter and veal. A few, however, from choice cows, are occasionally reared, and prove that our dairy stocks would be highly improved in appearance and quality if more generally resorted to. The usual practice is to permit the calves to remain with the cows until 5 weeks old, then separate them into adjoining fields, to prevent the usual fretting of both, and leave the calves to take care of themselves. Clover pasture is preferred to any other until they are 3 or 4 months old. Their value at 3 years of age, or with their second calf at their side, varies from $25 to $35, according to their promise of future profit. These limits in price will also apply to fair and good cows at the drove-yards in March, April, and May, and indeed, in limited number, at any time: dry cows of like quality command about $10 less per head than those accompanied by a young calf, or approaching that condition. We possess no data for estimating the precise value of corn in producing beef, or the comparative value of the different stocks of cattle named as feeders.

Hogs.—Various breeds of hogs have been introduced into this county, and much attention has been given to improving the stock by crossing them

in every direction. The present favorites are the result of these efforts, and inherit a liberal and perhaps barely predominating share of the "Berkshire" introduced some 15 years since. The comparatively small bone, and the disposition to take flesh and fat readily at all ages under light feeding, compensate satisfactorily for a lack of growth to a size common to some others. Their usual weight, when fat, at the age of 12 or 14 months, will average something less than 300 lbs., on the usual fare, but may, by high feeding, exceed that weight by a fourth or a third. They depend mainly on the refuse of the dairies and on pasture and nuts for their summer subsistence, until 4 or 6 weeks previously to being slaughtered, when they are fed liberally on *whole corn*. A large number of hogs are fed at our dairies wholly on sour milk, placed in pens at 4 or 5 weeks old, in March, April, and May, and kept until September and October, when they are slaughtered and sold at the Philadelphia market at from 7 to 10 cents per lb.

The foregoing embraces all the important operations to which our agricultural industry is directed, and the conditions under which it is pursued. If not too lengthy and tedious for your examination, we trust some things may be found serviceable to you in making your annual report.

Very respectfully yours, &c.

JOSEPH EDWARDS,
JOHN MILLER,
Committee of Del. County Institute of Science.

London, July 11th, 1850.

My Dear Sir:—Mr. Francis Bonynge has addressed to me a communication upon the cultivation of tea, which I transmit to you, and beg that it may be placed in the hands of some one from the South who takes interest in multiplying the productions of our soil. I believe the experiment of raising tea is now being tried in South Carolina. I sent, a few weeks since, a communication from a gentleman upon the subject of the production of the silkworm. This paper, with samples of silk, &c., was addressed to the Secretary of State. I have heard nothing from it. Will you do me the favor to ascertain whether the box containing the silk, with the papers that accompanied it, was received? It has appeared to me that silk can be produced in the United States with profit. With respect to the cultivation of tea, it would be satisfactory if some of our friends in the South would try the experiment. Will you favor me with your opinion upon the above subjects?

I am, my dear sir, most respectfully, your ob't serv t,

ABBOTT LAWRENCE.

Hon. THOMAS EWING, &c. &c. &c., *Washington.*

TEA CULTIVATION.—ASSAM, INDIA.

London, July 8th, 1850.

To His Excellency ABBOTT LAWRENCE, &c. &c.

Sir:—With reference to the subject of the interview with which you honored me a few days ago, I beg to submit the following observations on the cultivation of tea in India and China.

I have been cultivating the tea-plant, and manufacturing tea for five years in India, in a district east of Assam, called Namroop, and also in Assam itself. The tea-plant has been found in an indigenous state in the valley of Assam. Assam extends from 25° to 28° north latitude, and from 94° to 97° east of Greenwich, being within one degree of the western province of China, Yun-nan.

The valley is one of the most fertile in India, and enclosed on all sides by the Himalaya Mountains. The Great Bramapootrah, which is the united channel of the Dihing, the Dibong, and the Dihong rivers, divides the valley in its centre, which is also fed by numerous tributary streams, in its course to Goalparah, stated to be as many as 60. From the diversity of its soil and temperature of its climate, almost all European and eastern products might be raised within its circle.

TEMPERATURE.

The mean annual temperature is	67°
The four hottest months	80°
The colder or winter months	57°

RAINS.

Rain commences in March, and continues until October, giving fully seven months of wet weather.

PRODUCE.

Rice, which is the food of the people. Yams are found in great abundance (uncultivated) in the jungles; some of them weigh as much as 16 pounds, and are a very good substitute for the potato. There are several kinds. The natives rear the silkworm, and weave the silk into cloth, which is the principal, I may say, their only clothing. Cotton of a superior East India kind, is produced, but only cultivated with other crops at the same time. The erea copera is a course kind of silk, from an insect reared on a plant of that name, resembling a nettle. There are stick-lac, gum, the India-rubber tree, the tea-tree, the wild coffee-plant, and the nutmeg-plant. There are salt springs, petroleum springs, and coal in abundance, all over the country. Gold-dust used formerly to be collected in the streams when slavery existed in the country.

THE INHABITANTS OF THE FOREST

Are the elephant, rhinoceros, tigers, leopards, the jungle-dog, the jackall, the elk, deer, musk-deer: the bison is found higher up to the north, and also the buffalo and wild-hog.

THE NATIVES OF ASSAM

Are, without exception, the most demoralized of all Indians, the cause of which may be almost wholly attributed to the use of opium. Until 1839, they had scarcely any idea of money: their diet is rice, sometimes boiled, but oftener simply steeped in water. They eat fish, fowl, the wild-hog, and, when killed in the chase, they eat the buffalo, rhinoceros, and elephant.

The evil consequences of the use of opium, which sometimes sells for its own weight in silver, are, that the natives are dwindling away. An opium-eater is not long-lived, and his life is one continuous scene of misery. He is a thin, emaciated being, has no energy, no care for aught but to procure opium; if he cannot get it, he casts himself on the ground, rolls about in the most gloomy horrors, crying, in a heart-rending voice, "Khane ne! Khane ne!" "There is no opium." In this state he would sell his nearest kin for this honored drug; he would freely part with wife or child, if he had a child, which seldom the opium-eater has, for it destroys the generative powers, and there are seldom more than one or two children in any family, and sometimes whole villages of women are to be found with scarcely a man. I have been somewhat out of the latitude of my subject, in thus bringing the valley of Assam immediately under your Excellency's observation, as the indigenous locality of tea in India.

SOIL FIT FOR TEA.

A reddish loose soil, in which ochre is pretty abundant.

Localities.—Table-lands and around the bases of hills are best. Lands which are low and on which water rests, such as paddy lands, or slightly elevated lands among paddy grounds, being always cold and wet, are unfit for tea. High table-lands, which are of dry and stiff soil, sides of mountains, after a moderate elevation, are also very unsuited, and the produce will not pay for the cultivation. However, the plant will grow in all the above places. Moisture is very necessary for the plant; that is, such moisture as will pass away and not keep the ground cold. In Assam, there are seven months of rainy weather, and therefore irrigation is unnecessary. On the Kamaon hills, where the government of India are carrying on tea-planting, no success will or can attend the speculation. There are three years of irrigation required, and the plant takes, consequently, seven to eight years to arrive at its full yield, and even then the produce is very poor with regard to quantity, though in quality it may be superior.

The plant in Assam arrives at its full yield in four or five years, and will with care continue in a healthy state for 20 years, and there is no irrigation required because of the long duration of the rains. There are, however, in March, only a few necessary showers, and April is not what may be called a wet month. The rains are heavy in June, July, and August, and wear away by the end of September.

PRODUCE OF THE PLANT, AND AGE.

The plant is raised from seeds. Plants might be raised from slips also, but it would not answer beyond the mere fact of an experiment. Tea-seeds being sown in December, the plants therefrom could be transplanted during the following rains; that is, from June to the end of the year. The plant should be transplanted before it is two years old.

Seeds may be sown in November, December, and January. The young plants should be planted the following September, October, and November —this would be the first year. A few leaves ought to be taken off the young plant the second year. Thus, it will yield about 40 lbs. per acre on the third year. On the fourth year, the produce per acre would be about 150 lbs. On the fifth year, the produce should, in a rich soil, be 320 lbs. per acre of 43,560 square feet, *and so continue for at least* 20 *years.*

In the following *estimate*, I have made the second year the first, because the expense of putting the seeds into the ground is little or nothing. The estimate is made out of what the cultivation of 1000 poorahs, or 1250 acres, of land, and the manufacture of tea thereon, would cost for four years, with the probable return in Assam, India.

ESTIMATE OF EXPENSES AND RETURNS ON A CULTIVATION OF 1250 ACRES, OF 43,560 SQUARE FEET EACH.

First Year, that is, the year of transplanting, say from Nov. to Nov.	
1 superintendent, at £600 per annum	£600
1 first class assistant, at £300 per annum	300
1 second " " at £180 " "	180
Clearing 1250 acres, transplanting, and keeping clear for the year	975
Elephants and horses	120
Buildings, tools, &c.	400
Total	£2575
Second Year:	
European superintendence, and native head establishment, &c.	£1440
Weeding and hoeing	475
Manufacturing, say 40 lbs. of tea per acre, 50,000 lbs.	500
Chests, packing, and transit to Calcutta, 1200 miles	200
Total	£2615
Third Year:	
European and native establishment, elephants, &c.	£1740
Hoeing and weeding	470
Manufacturing, say 200,000 lbs. of tea	150
Chests, packing, and transit to Calcutta	1000
Total	£3360
Fourth Year:	
European and native head establishment, elephants, &c.	£1800
Hoeing, weeding, &c.	470
Manufacturing, say 360,000 lbs. of tea	1575
Chests, packing, and transit to Calcutta	1800
Total	£5645

Produce first year, none of any consequence.	
" second year, 40 lbs. per acre, say	50,000 lbs.
" third year, 160 " " " "	200,000 "
" fourth year, 300 " " " "	375,000 "

It will be observed that the clearing of 1250 acres, transplanting, and keeping clear for the year, is put down at £975. This is what it would cost in Assam. This item in America would probably vary very much—but of this your excellency will be the best able to judge.

Wages in Assam, as herein estimated, are about seven shillings a month, without food or any other allowance. There will be a very material difference, therefore, if we calculate the amount of American hire of labor by that of Assam: but other matters must be also well weighed, viz. the amount of work an American laborer will do, and that an Assamee will perform.

I see the cost of hoeing an acre of land 12 inches deep, under the Fermoy Farming Society—the laborer earning 1*s.* 2*d.* per diem—is stated to be 13*s.* 4*d.*; however, one-third of the labor would not be necessary for land, to fit it for the tea-plant.

There is another consideration: miserably poor and indolent as the Assam laborer is, he is also dishonest, and, without constant supervision, will not work at all. Hence, there is about £1600 of the £5645 for such supervision, or about 29 per cent. This would be greatly reduced in America, —if we also take into consideration the intelligence and energy of the Americans, and the probability there would be of all the rolling being performed by machinery.

In the estimate I have given, I have only made the Assam laborer work about 5 hours per diem, and that in such a manner as he does work.

Your excellency will see, by this estimate, that the expense, when the tea-plant is in full produce—that is, the fourth year after transplanting—of cultivating the soil and manufacturing the tea, packages, and packing, and transit by the rude country-boats of India, 1200 miles on the Bramapootrah, is about three-pence farthing (3¼*d.*) the pound.

Taking the above considerations together, as well as the cheapness of timber in America, and the little expense at which it may be cut up by the sawmill, I have no doubt the American tea should not cost more than what it has been made to appear in my estimate for Assam. Even admitting that it cost one penny a pound more, which would be a great deal, still I suppose you cannot have your teas at the ship-side, at Canton, for less than one shilling per pound: I mean, of course, the average. You take a far superior tea from the Chinese to the English, and the average of English teas, being some 40 millions of the inferior black kinds, and 13 millions of green and superior black, was, in 1848, at the ship-side in Canton, one shilling per pound.

TEA CULTURE IN CHINA.

Having made, for your excellency's consideration, these brief remarks on the expense of cultivation, I will now proceed with a brief notice of the tea localities of China, in the following order:

1*st.* Temperature.

2*d.* Soil.

3*d.* Geographical position.

4*th.* Whether, if the cultivation diverge from that position, the tea will be of good quality, and profitable for commercial purposes.

Temperature.—Mr. Bell, in his book on the tea cultivation in China, says, a temperature of a mean annual of 62° to 67° is the best. From my experience, I can state that tea will not produce, or rather will not be productive, so as to pay for labor, under excess of heat or cold.

The temperature of Jogan, in the Tokeen provinces, N. lat. 27° 4′, nearly agrees with that of Assam with regard to cold—the heat being somewhat greater, viz.:

		Assam.
Mean annual	70°	67°
Four hottest months	82° 15′	80°
" coldest "	57°	57°

Mr. Bell states, "The Bohea country, in Tokeen, lat. 27°, differs little from the Hyson-green districts in point of temperature. The tea-men," he says, "describe the fall of snow, as well as the thickness of the ice, as somewhat less, and the cold generally less severe; that it is a mountainous district, with sheltered valleys, fenced and protected from the cold north-easterly and north-westerly winds by the lofty and continuous range of mountains which forms the barrier between this province and those of Che-Keang and Keangse."

"In the green-tea districts, lat. 29° 58′, the leaves," says Mr. Bell, "of the first gathering were injured by the frost and snow which had fallen in April of 1809."

Shanghae, which is about 90 geographical miles to the north of the green-tea district, that is, N. lat. 31° 20′, must evidently be too unfavorable for the economical cultivation of the tea-plant for commercial purposes, although, for domestic use, it may be cultivated in sheltered places. Mr. Fortune states that, in July, the thermometer stood, in the shade, at 100°. This is 6 degrees of heat greater than that of Calcutta; and the sun of Bengal is too powerful for the tea-plant. Mr. Fortune further adds, that the thermometer was as low as 26° in 1844–45, and that the remains of the cotton and other tropical plants were destroyed by the frost; and that the Chinese asserted that the year was a mild one—"therefore," says Mr. F., "I have little doubt that in the worst years the thermometer may be found at 20° below freezing-point, or at 12° Fahrenheit, and perhaps lower."

At Pekin, N. lat., Mr. Bell saw the plants in a garden, as big as a currant-bush, unproductive, and kept as curiosities. Therefore, I should say that, from Shanghae northwards, tea would not answer for commercial purposes. Again, if we go down to N. lat. of Amoy, 24° 30′, and Quangton, 30°, it is well known that the leaves are very inferior. Mr. Bell says the Amoy (Ankoy) teas are very inferior, and those of the province of Quangton of still greater inferiority.

I would observe, therefore, that China cannot very materially increase the exports of tea, and that the country, being subject to greater degrees of heat and cold than any other kingdom under the same latitude, would be less suitable than many countries in which it has never been thought of.

Soil.—It has been supposed that the Chinese bring their barren mountains and hills under cultivation. They may do so; but they can never make barren or sterile mountains or any unfavorable soil bear productive tea-trees. It is a physical impossibility for the tea-plant to be productive in any other than a rich, deep soil. Hill plants, but not barren hill plants, may produce a small quantity of a fine description of tea, but it will be at a heavy expense.

The plant has but a single root, which grows directly downwards, and, if any article opposes its direction, it remains dwarfish and sterile, or otherwise it dies. I have taken up a tea-tree some 40 feet high, and its branches extending over a space of some sixteen feet in diameter: its root was about 3

feet 9 inches in length, with a few straggling fibres growing out from the main one.

The Catholic missionaries replied to some inquiries made of them, (these missionaries, and they only, make their way into the interior of China,) that "the soil should consist of a vegetable mould, sprinkled with sand, light and loose, and rather moist." And again, "the tea may be planted either in a rich or a poor-soil, sandy or garden-soil, but that which is moist is most suitable, and the eastern aspect the best; but garden grounds and the embankments of gardens and fields are the most favorable."

Gutzlaff says: "Tea grows on the most sterile grounds, on the sunny ridges of hills, principally between north latitude 25° and 30°, in the province of Tokeen, Che Keang, and Keang-seo, and almost all over the Chinese empire. Like the vine, the quality of its leaves depends very much on its soil. It grows in the most barren soil, but the leaves are coarse and unfit for use."

Mr. Fortune states that "the soil in the tea districts is of course richer in the northern provinces than in Quang-tong. In Tokeen and Che Keang it is a rich sandy loam." "Tea-shrubs will not succeed well unless they have rich soil to grow in."

What is the geographical position?—Mr. Bell states that "it has been observed that the Chinese universally agree, from remote antiquity to the present time, that only the Bohea Mountains produce the highest-flavored black tea. They moreover affirm that it is only in the central division of these mountains, which are known to the Chinese by the appellation of Vuy-shan, (inner mountains,) where the highest-flavored teas are produced; and that the teas deteriorate in quality, till, in some of the remote districts, the leaves are thin and poor, have no fragrance or sweetness in infusion, and no labor can make them good." And, "the Ankoy teas, grown in the vicinity of Amoy, 24° 30′, are for the most part inferior; and the Honan and Waping teas, of Quang-ton, may be given as examples of still greater inferiority. The vast inferiority of the flavor of Twankoy tea, the product of the green-tea hills, (with little or no attention paid to its culture,) to that of the Hyson, of the highly cultivated plant of the plains, would be apparent and interesting to any one disposed to try the experiment." Also: "The towns which extend 70 ly (23 miles) from Vu-ye Shang, are called Py-keen-tien, Cza Ty, Tang-moa-kown, Nan-nang, &c. &c: the leaves are thin and small, and of no substance; and whether green or black, or made with much care, yet they have no fragrance. Tea is also produced as far as Yew-ping Shang, Gen Nong, Kien Yang, Hew Shang, and other places, but is unfit for use."

"The extent," says Gutzlaff, "that produces the best Bohea, is no more than 40 ly, or 12 miles, in circumference. The total of the tea-plantations, as taken from official statistics, are 500,273, which may be set down as varying from a few perches up to a few acres."

Whether, if the tea-plant cultivation diverge from certain localities, the tea will be of a good quality?—The latitudes for the tea cultivation in China are 27°, 28°, 29°, and 30°, and probably extend from the east to the west of China along these latitudes, over through the Singphoo country, Kooking, and Assam. I have never heard of it being discovered on the west side of the Burampotree or Bramapotree, in an indigenous state. But I cannot conceive that there is any obstacle against it being extended far to the west, through these latitudes, until the hot winds of Hindostan would interfere with its progress.

Valleys seem to be the favorite places in the east, being protected from the great extremes of temperature, and from the clouds being driven into the valleys and retained there by the contrary winds entering into them from the different breaks in the amphitheatre of mountains around, causing a greater and more incessant fall of rain. However, as already stated, China is subject to greater extremes of heat and cold than any other country, perhaps, in the world, placed in the same parallels of latitude; and therefore must be less suitable than more temperate climates for the production of this plant.

From the 31st degree of north latitude, northwards, the winter is too severe, as well as the heat of summer too intense, for the profitable cultivation of tea. Even in the green-tea district, lat. 29° 58′, the trees have to be bound round with straw to protect them from frost and snow. And, again, if we go down to the 24th deg. of N. lat., we find the teas of (Amoy) Ankoy very inferior, and those of Quang-ton, (Canton,) N. lat. 23°, of still greater inferiority; and also, that "tea deteriorates in quality, as the plantations diverge from the Bohea hills, till, in some of the most remote districts, the leaves are thin and poor, and have no fragrance or sweetness in infusion, and that no labor can make them good."—*Ball.*

"Teas of the neighborhood of Canton—the quality is such that no process of manufacture would render them suitable for the British market."—*Mr. T. A. Gibbs, evidence before the British parliamentary committee.*

"The tea viridis," says Mr. Fortune, in writing on Chusan, "is cultivated everywhere, but, if we except a small quantity sent over to the mainland, the whole is used by themselves. Every small farmer and cottager has a few plants on his premises, which he rears with considerable care, but seems to have no wish to enter into its cultivation on a larger scale. Indeed, it is questionable whether it would answer, as the soil is scarcely rich enough; and although the shrub grows pretty well, it is far from being as luxuriant as in the large districts of the mainland." Chusan is in N. lat. 30°. Thus we see, whether the exportation of tea be at Canton, some 1000 miles from the Bohea district, of a very difficult inland transit, or at Shanghae, or by caravans to the north and north-west, that the export, in these different directions, to Great Britain and America, and to Russia, Lama, &c., is supplied from the 28th, 29th, and 30th degrees of north latitude.

ITS INTRODUCTION INTO AMERICA.

I have so far entered into this subject to show your excellency not only the conditions of soil and temperature necessary, but also what ought to be avoided. Superficial observers of the tea-plant suppose, because the plant is to be found over nearly the entire extent of China, that therefore it will be productive everywhere. Such statements ought to be carefully guarded against.

What has defeated its successful cultivation in India? Erroneous ideas, coupled with a discouraging government.

Therefore, such should be carefully avoided, in introducing tea into America. A first failure would probably throw it back for a series of years, and this would be a serious loss. Taking into consideration the mighty extent of America, its great and commanding position, its tremendous strides towards being not only one of the greatest nations on the globe, but one of the richest, most populous and considerable of the five divisions of our earth,

I have no doubt, nor can there be any doubt, that there is a vast field in America for the cultivation of tea, coffee, indigo, &c.

Should your government undertake to introduce it, I beg to offer you my humble services. The cost would be but trifling, and the great requirement of America for this object is, that its government do get up gardens for the growth of tea-seeds. This necessary step toward this important object is easy, and requires, as I have already stated, little outlay. I feel an earnest wish that your excellency consider this paper attentively, and that your excellency would, immediately, and without waiting for reference to your government, take on yourself to forward this cultivation in America; because, by your delaying for a reply from Washington, the years 1850 and 1851 will be lost; and the *onus* of your acting on the suggestion which I would, if these papers meet your excellency's approval, offer you for your guidance, would not be as much as £100, probably not £50; and you would, for this sum, have some value for the money, in case your excellency's government declined taking up the subject as a government matter. Therefore, leaving these considerations for your excellency's minute and grave reflection, I will beg, as you have been graciously pleased to direct me, to give you a slight account of myself.

I am one who, as many of the children of the fair Emerald Island, had to seek a livelihood in a far distant land. I left, seventeen years ago, the domestic fireside of my foster-father, in the Town's lands of Ballentuber, four miles from Ballemahon, in the county of Longford, and proceeded to Dublin. After being placed under the Rev. Mr. Burrows, to get some little education, in addition to the very little I had, I was sent out, in April, 1835, in the bark Enmore, of Liverpool, commanded by Lieutenant Swanson, R. N., a connection of my mother. I was nearly wrecked off Liverpool, and ultimately arrived at Madras, in August, 1835. From Madras, I proceeded to Calcutta, where, after a stay of three weeks, I was put into a boat on the Ganges, to proceed upwards of 1200 miles, with native servants and native crew. Rustic as I was, I had greater disadvantages still to contend with. It was the first time I had ever been thrown on my own resources, and for the first time, too, I found myself alone, to deal with men of whose language I did not understand one word—nor did they of mine. However, what I could not make them understand by signs, I had to do myself; and by the time two months and 16 days had passed, when we reached Turackabad, on the Doab, I could explain some of my ideas to them.

In the districts of Turackabad, or Tully Ghen, about 90 miles above Cowanpoore, I remained till the end of 1839, engaged in making indigo and manufacturing saltpetre. I then returned to Calcutta, and was induced to proceed to Assam, to enter into tea-plant cultivation. I got some 8 or 10 acres of land, down in Assam, and was quietly proceeding in my labors to do the best I could in that wild, depopulated region.

Government, the Honorable East India Company, had military possession of Namroop, to the east of Assam Proper, and was desirous to take actual possession of it; and, with this view, induced a native chief to work some tea-lands on government advances, and undertook, through its own superintendent, to cultivate other lands, called Koojoo. The superintendent was not a very active man, and failed. Government then applied to the Assam Tea Company to take up the cultivation of the land, proposing to them to build a brick building for the military guard at Koojoo. The Assam Tea Company declined, whereupon the government did a second

time propose to that body to cultivate the lands, waiving the above request. The company again declined. Government then induced me to cultivate the lands, and verbally promised me the protection and the good-will of government, and directed me to put in an application as usual for the lands, in a written reply to which they stated that I would get a lease of the lands as soon as surveyed, and that there was a guard to protect the place. For the space of four years, the government permitted me, in every confidence in its sincerity and good faith, to cultivate the lands; but, after these four years, withdrew the guard, which, a few months prior, I was given to understand, by the governor-general's agent, would not be removed, and without giving me any notice whatever of the removal. Within the then five years, these Tartars had twice rebelled against government, and only a few months before was the last rebellion put down; and at the time of depriving me, unprepared, of the protection of the guard, the chiefs around me were in irons in their powder-magazine of Debroo Ghen. I was thus exposed to a savage, infuriated people, attacked at midnight, and escaped through a most miraculous incident. The Tartars got into the verandah of the house before I saw them—in fact, it was only that instant that I providentially awoke. When I saw them, I started out of bed, and cried out to the two men who should have been watching at the door, but who, unfortunately, went to sleep. They were instantly cut down, and a rush made at my bed. I met the party with the discharge of one of the barrels of my gun, one of whom, receiving its contents, fell into the bed, and, in the dark, was cut in pieces, under the supposition that it was me. While this was going on, I was standing on the other side of the bed, considering what was to be done; but finding some of the party was coming round in my direction, I laid the gun, which was heavily loaded with three pistol-balls and shot, across the bed, and fired a second time into the party, who, terrified, rushed out of the house—except the man on the bed and two more, who then fell—but placed a guard at the door to prevent my exit. The table on which I kept my ammunition was upset, my Tartar swords had been carried off, and there was nothing left for me but to escape. The house was a mat-house, and I got out over the matted wall and clung to the roof until the party, who were on the same side of the house, looking for a light, passed round to the front, when I dropped down, and wandered that night and the following day, pursued by these savages; and at last, faint from loss of blood by the leeches, and suffering from enlargement of spleen and intermittent fever, I reached a guard-house some 16 miles distant. Government refused me any compensation or amends whatever, and told me there would be no guard placed at Koojoo again; nor would they fulfil their promise to me to give me a lease of the lands. The consequence was, I lost, of £5,000 outlaid, £3,000 and my five years' time. And the reprehensible and unmanly falsehoods were put forward by the local authorities, with which the whole body of the government has identified itself, that I irritated these people to attack me by beating them and not paying them their wages. When I showed them that throughout Assam wages were paid in advance, then they told me that I beat them and pleased them afterwards. These are the verbal statements to me by Mr. Shepherd, the chairman, a month ago. I have applied to get these charges made openly, and in writing; and, as yet, government has not replied to my application. Thus it is, that, under plea of ill-treatment of a third party, they violate their written and verbal engagements to me.

Under these circumstances, I am placed in a painful position—for Mr. Shepherd and his co-directors, having the full consciousness of the wrong that has been done me, instead of dealing openly with the matter, throw every obstacle in my way:—first, they oblige me to send my papers out to India, after retaining them two months in Leadenhall street; then, when they come home, they keep them two months more before they give me a reply; then they make the above statements, and, when I wish to have them in writing, keep silent for another two months, and, lest I should trouble them again on the subject, refuse me my documents, which they had twice directed me to call for, and twice declined to give up—and then come out with the statement that they were left in Bengal. After much difficulty, I could get only unattested copies—copies pretended to have been received from Bengal; but which had not even the usual signature of the clerk who copied, nor that of the head of the office in which they were stated to be copied.

Under these circumstances, I may well turn my thoughts to your land of liberty, and, like my countrymen, seek an asylum and a home in its bosom; and, for this purpose, I trust I may meet your kind offices, for which I will feel duly grateful.

I beg here to copy a few extracts from a letter of the governor-general's agent on the east frontier, dated,

"*On the River, 24th July*, 1849.

"*To* FRANK BONYNGE, Esq.

"*Dear Sir:*—I was favored with your note of the 11th, from Kedgeree, last evening, and, in reply, I have simply to say, that I was not aware of any thing like a feeling on my part to keep you out of any tract you could fairly be put in possession of; and you will have found, the moment I knew the Assam Company were willing to resign the plantations you wished for, I immediately wrote you to that effect.

"You may remember that I took much interest in your first commencement of operations, and was willing to assist you to the best of my power, and have never ceased to regret the circumstances which caused you to retire from manufacturing; as it always appeared to me, that of all the persons who have embarked in these speculations, you were the most likely to succeed, and to do justice to our indigenous tea and capabilities of raising China tea, by your untiring activity and the ability and zeal in the cause which you evidently had evinced. * * * *

"I am, dear Sir, faithfully yours,

"FRAS. JENKINS."

I will, with your permission, submit to you a copy of a letter I am now about to draw up, on my case, to the East India Company Directors, so that your excellency may know my case the better, and clearly understand my position. I have the honor to be, Sir,

Your excellency's most humble and obedient servant,

FRANK BONYNGE.

Litchfield, Conn., December, 1850.

Sir:—In reply to a few of the inquiries in the circular issued from the United States Patent Office, under date of August 26th, 1850, (one of which I have received per mail,) I have only given my own opinion, or estimate, without consulting with the farmers in other sections of this town. I know not how extensively the above-named circular has been distributed among them, or how extensively such or similar inquiries have been answered and published in former reports, as I have had only the one for 1848; but, in that, I observe very few statements either of the farming or mechanical interests of this State.

CORN.

The varieties most esteemed in this section are the eight-rowed yellow flint, and white flint, as they are earlier and less liable to be injured by frost. I think the average product per acre to be about 40 bushels. Some extra fields go as high as 80 or 90. The average cost of production per bushel is probably *more* than 50 cents. The practice has formerly been to plough the land in ridges, by turning two furrows together, and plant on the ridges, about 3 feet apart, and 4 or 5 kernels in a hill; but the system of clean ploughing is now practised a great deal, and to advantage. We hoe our corn but twice, although a third hoeing would be highly beneficial; but then our haying is upon us, and must be attended to.

The best method of feeding corn, decidedly, is to grind it. If for beef, ground with the cob, and fed dry; if for pork, shelled and mixed with about one-third as much other grain, and scalded.

OATS.

I think the average yield of our oat crop is something less than corn. Three bushels are usually sown on an acre of land. Oats, mixed with corn, for hog-feed, are coming into favor very much, as the animals like it better than clear cornmeal, and will fatten faster, fed with it.

CATTLE.

The cost of rearing neat cattle till three years old may be put down as follows:—1st year, $7; 2d year, the same, as they will live on coarser fodder; and, the 3d year, at about $9; making $23 at three years old, which is as much as ordinary animals will sell for at that age. But those heifers which promise fair for cows will bring from $25 to $30, and fairly matched steers, $60 or $80 a pair. Extraordinary steers, sometimes $100 or $120 a yoke, at that age.

Cows for the dairy average about $30 in the spring, and $18 to $20 in the fall of the year.

FATTENING PORK.

The cheapest method, in this section, where grain is comparatively high, is, I think, to take spring pigs and feed them with the slops of the dairy, with a little provender mixed in, until September; then, in addition, boil the

refuse potatoes and apples together, and feed for 6 or 8 weeks; afterwards for a few weeks, with provender scalded.

Weight.—275 or 300 lbs. of pork, is a fair weight of a pig of 9 or 10 months old, but one cwt. added to that, is no uncommon occurrence.

The comparative value of apples with potatoes, when fed as above, is, perhaps,—one bushel of apples boiled with two of potatoes is worth as much as three bushels of potatoes, although *not* worth as much when fed alone.

With respect,

CYRUS CATLIN.

Hon. Commissioner of Patents.

Louisville, Kentucky, December, 1850.

Sir:—Having by request prepared the accompanying meteorological table for insertion in several publications about to be issued, I have sent you a copy, although the tables embrace more than would seem to constitute a proper answer to the inquiries propounded in your circular. It will be an easy matter to glean out what may be deemed useful for your report, and reject the balance.

It is gratifying to the lovers of accurate knowledge to witness with what rapidity the science of meteorology is winning the confidence and favor of the agriculturist. But as the number of co-laborers in the field of exploration is yet quite too limited, I shall perhaps best subserve your wishes by confining my few remarks to details suggestive of the advantages which may be expected to accrue to the arts of husbandry, pomology, and horticulture, by calling in this science to their aid. In horticulture, what may be considered the greatest triumph of the present, if not of any age, is the successful growing in northern Europe of the new water-lily, a gigantic native of the equator, one single leaf of which measures more square inches than a farmer's dining-table, and which said single leaf contains airducts and vesicles enough to displace more than 20 gallons of water—thus enabling it to buoy up the weight of a man. But this triumph has been won by a meteorological analysis of the conditions with which this lily is surrounded in its natural habitat, and a copying of the same in its new abode, not even omitting in the waters of its new home the almost scalding temperature and whirling motion of that leviathan of rivers, the Amazon, in whose broad waters this remarkable plant delights to dwell.

In agriculture, there are many plants grown that are exotics, that are introduced either from the north or from the south, and that will mature best as grown in the colder or warmer portions of the growing-season; indeed, I think there are very few, that fully answer the farmer's wishes, planted without regard to this fitness of season. It is true, we cannot now follow all these plants to their native wilds, in order to ascertain how much of water and how much of heat best promote their thrift. But, by the aid of a series of well-conducted meteorological observations and the simultaneous thrift of cultivated plants, nearly the same ends are accomplished. There is no fact plainer than the truth that this knowledge is desirable. The true inquiry is, do we possess it? I think not; and I will refer to the culture of a single article, both to prove a want of this knowledge and the agency of meteorology in leading us to truth. The article referred to is

the sweet-potato. I think, in the neighbourhood of Louisville a great deal of labour is thrown away by anticipating the season for planting this esculent—by forcing it into the open air before the mean temperature has risen to summer heat, the plants remaining stationary or dying, and weeds taking possession of the ground; thus giving occasion for at least one hoeing more than a later transplanting would require. This opinion is founded upon the following facts: that is to say, I have grown the potato for market for some 20 years, and I think the planting this season may be said to range between the middle and last of May, sometimes a little sooner or later. Once only in that time have I known the sweet-potato to do well planted in the open air before the first of May. Again, it has been a practice, in my family, to give the sets in the hot-beds too small for use at the general planting, to the servants, for their patches or family gardens. It has been again and again remarked, during this 20 years experience, that these very late plants, in the family-gardens of the servants, have secured a better "*stand*" —a more uniform growth—and, when the cultivation has been good, a yield nearly, if not quite, equal to that of the main crop. Again, the summer of 1846 was one of the longest and hottest experienced in this climate, the mean heat, from April to October, being about 71°. This season was too long for the growth of the red sweet-potato, planted in May; and it was in housing this crop that I was first taught to know that potatoes may be "*frost-bitten*" before it is yet cold enough to freeze; or, what is the same thing, acquire that flavor generally supposed to result from the action of frost. I take the following extract from my diary, under date of October 11, 1846: "Cooked, on the 9th and 10th, two lots of red potatoes, supposed to be over-ripe—the root plump, but skin blotched with dark spots; eyes, at point, decayed—from whence I conclude that a sound sweet-potato has all its eyes plump, however little developed, whilst a decaying of the eyes, either at the side or end, will impart a bad flavor to the whole tissue." These facts themselves appear to me sufficient to warrant a belief that the whole of a long summer is not needed for growing this potato, and that, if so, it is false economy of labor to be in too much haste to plant. But a history of this year's crop is to the point, and conclusive. The past spring has been cold, dry, and backward. No living man, perhaps, has an experience old enough to have seen summer crops so unpromising at any former harvest as they were at the last; sweet-potato sets had hardly begun to vegetate at the period they were transplanted in former years; yet, under the growing influence of a temperature, although not remarkably high, yet uniformly so, throughout July, August, and part of September, the yield of this crop brought to perfection in less than 90 growing days is considerably above an average in quantity and of good quality; nor is any part of the result ascribable to increased fertility of soil, the field cultivated being an old potato-ground, unmanured.

The pomologist, in search of useful facts, will from this science derive no less assistance than the farmer or gardener; and I will close this article by a single experiment, in illustration. In 1840, strongly suspecting intense cold to be one of the causes producing blight among fruit-trees, and aware that (in consequence of the power on the part of trees to grow for one season after receiving a death-blow in the trunk or large branches) the only symptoms capable of pointing to the true harm-producing agency are often obliterated by time, before the casual observer suspects the presence of injury, I then determined to invoke the assistance of the unerring in-

struments of meteorology as sentinels to sound the alarm on every visitation of intensity of heat or of cold, hoping that, if either of these violent powers were the culprit, I should be able to detect him "*flagrante delictu*," or that, by a continued record of facts, the case of his guilt might be made out upon the evidence of circumstances.

In Kentucky, the first remarkable spell of intense cold occurring within the last ten years, happened in December, 1846, a month which would have done credit to a New-England winter, its mean being 26°, and the thermometer at one time, for the space of forty-eight hours, not rising above 10° above zero; for some days the expansion of trees in the forest produced a continued cracking, not unlike the promiscuous firing of small arms.

On the occurrence of a thaw, and immediate examination, many peach-trees were found to have the bark burst throughout the extent of the trunk: the bark on the branches of one or two pear-trees was found to give way to the touch, and, out of a lot of 60 hardy young cherry-trees, about half were entirely killed, or so injured as to produce death. In a small orchard of plums measuring six inches in diameter, and very thrifty, about half a dozen had the bark entirely separated from the alburnum—in most of them the fact not being discernible except by pressure, and, when touched, the bark being found to hang loosely on all sides of the trunk. In two cases the bark was burst, as in the case of the peaches, and, on making any two horizontal sections on the trunk, the intervening bark might have been rolled off. It is needless to add that these plum-trees all died, and that the first outward evidence of disease or injury in those cases where the bark was loosened, but not burst, was a gradual shrivelling of the bark on the coming of hot weather.

Very respectfully, [illegible] L. YOUNG.

A TABLE

Showing the Monthly and Annual Mean Temperature for Nine successive Years, beginning in October, 1841, and closing in September, 1850; also the Monthly and Annual Fall of Rain for the same period, in the vicinity of Louisville, Kentucky.

	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.		Mean annual heat.	Yearly rain in inches.
	Total.	Rain in inches.	Mean heat.	Rain in inches.	Mean heat.	Rain in inches.	Mean heat.	Rain in inches.	Mean heat.	Rain in inches.	Mean heat.	Rain in inches.	Mean heat.	Rain in inches.	Mean heat.	Rain in inches.	Mean heat.	Rain in inches.	Mean heat.	Rain in inches.	Mean heat.	Rain in inches.	Mean heat.	Rain in inches.		
1842	49.5	4.54	46.	4.60	35.3	4.14	38.5	3.81	38.8	6.40	53.8	2.67	58.	2.05	60.5	4.33	68.	7.48	70.	3.42	70.	1.30	65.	1.94	54.4	46.68
1843	51.	1.89	36.5	2.30	36.	3.12	38.	3.40	28.	2.06	30.	2.75	54.5	5.11	65.	8.45	73.7	3.15	75.	5.89	72.	3.54	70.	3.79	52.5	45.47
1844	49.5	3.82	42.3	3.73	37.3	2.98	33.8	2.46	39.7	1.68	47.	3.23	66.	3.28	67.3	7.12	72.6	4.64	77.4	6.76	72.	2.95	67.8	.76	55.8	43.41
1845	51.7	3.47	46.4	2.23	38.5	1.82	29.4	3.01	42.3	2.68	47.	5.98	62.3	3.04	61.7	1.45	74.2	8.78	76.	4.34	76.	4.85	67.5	4.13	56.	45.19
1846	54.	1.76	43.4	1.85	26.8	1.41	38.2	2.86	34.8	3.06	47.6	3.11	59.6	3.50	68.7	4.73	69.8	7.09	77.7	2.78	77.3	5.78	72.3	2.46	55.5	40.30
1847	55.2	1.73	47.2	2.86	43.	7.84	34.	3.31	38.5	5.01	43.2	6.14	59.	3.27	61.	1.80	71.5	4.99	74.9	2.24	71.8	2.80	66.9	3.94	55.8	45.93
1848	56.3	5.03	48.	5.19	35.8	6.40	40.4	4.25	40.	4.46	47.	3.52	54.5	1.32	69.3	5.10	72.4	3.23	73.	11.47	74.3	5.56	64.3	1.34	55.8	56.90
1849	52.7	2.46	37.9	4.75	43.2	10.90	32.6	5.53	32.6	3.06	49.9	4.08	53.	2.23	61.2	4.29	72.	4.65	72.	4.07	71.	2.78	71.	1.01	54.2	49.78
1850	53.	4.69	49.7	1.33	32.	7.55	37.	6.20	36.	4.43	42.5	8.18	49.8	5.09	57.8	2.48	69.2	9.24	76.	8.17	75.	5.34	65.7	2.55	53.58	63.25

A TABLE

Exhibiting for Nine successive Years the Semi-annual and Annual Mean Temperature, Aggregate of Rain, Extremes of Heat and Cold, Beginning and End of the Growing Season, also the Hottest Month, and its Mean Temperature.

Years.	Coldest day of the year.	Height of mercury.	Hottest day of the year.	Height of mercury.	Half-yearly mean of heat from October to April.	Rain in inches from October to April.	Half-yearly mean of heat from April to October.	Rain in inches from April to October.	Annual mean of heat from 1st October to 1st October.	Rain in inches from October to October.	Spring growth, beginning, as indicated by the fall of peach-bloom.	Days preceding above heat of 45.	Close of growing season as indicated by first frost.	Degrees of cold.	Hottest month.	Mean of hottest month.
1842	February 17	4°	September..11	98°	43.5	26.16	65.	20.32	52.4	46.68	March 27	33	October 10	30	July	70.
1843	do. 16	— 3	July 1	95	36.5	15.55	68.5	29.93	52.5	45.47	April 25	27	October 14	25	July	75.3
1844	January 29	— 4	August 20	98	41.2	17.90	70.3	25.51	55.8	43.41	March 29	26	October 12	30	July	77.4
1845	December.....19	3	July 15	96	42.5	19.19	69.9	26.60	56.	45.19	April.....10	33	October 15	28	July	7.
1846	December..... 2	—10	August 6	100	40.9	13.96	70.9	26.34	56.5	40.30	April.....10	33	October.....18	29	July	7
1847	January.....11	— 9	July 19	95	43.5	26.89	67.5	19.04	55.5	45.93	April.....15	32	October.....15	27	July	7
1848	January.....10	— 6	June.....27	93	44.5	28.88	68.	28.02	55.7	56.90	March 29	26	September..23	30	August	7
1849	February 19	— 7	August.....22	89	41.4	30.78	67.	19—	54.2	49.78	April 5	31	October.....10	29	July	72.
1850	February 4	1	July..... 6	91	42.	32.40	65.6	32.9	53.6	65.25	April.....19	28	October..... 6	30	July	76.

WHEAT.

Different kinds of summer wheat have been universally cultivated in this vicinity until recently, and the farmers have been under the necessity of abandoning it almost entirely, for the reason that it has proved almost an entire failure. Within the last three or four years, the farmers have been experimenting with winter wheat, and have found their experiments crowned with success beyond their expectations.

I have now before me the statements of Robert Johnson, of Gorham, Cumberland County, Me., in which he states, that he has raised this season, from one bushel's sowing, 29 bushels; said one bushel was sown upon 157 square rods of ground, upon which were spread two cords of compost manure, and sown in the month of August, 1849. In conversation with Mr. Johnson, he says, "I should recommend sowing with the wheat two bushels of oats the acre, as the oats would get quite a growth before the frost would kill them down, and then make a covering for the wheat through the winter."

CORN.

The most esteemed varieties are the large yellow, 10 to 20 rows, and the long eight-rowed, both of which are good varieties; but by observation I have found that the greatest crops come from the large variety.

The average product from an acre is about 35 bushels, although in some instances the product has trebled it. The best method of culture is to spread the manure, plough immediately, and harrow well, and plant in squares about 3 feet and 8 inches apart, and cultivate both ways with a horse. For feeding, I grind the ears and wet up with hot water for hogs; and for cattle and horses, mix with chopped feed and wet up together.

The manure formed by hogs, while consuming 20 bushels of corn, if they are well supplied with loam and muck, will add greatly to the crop, say one third.

HOGS.

The best breed, as has been proved, in this vicinity is the cross of the Berkshire and grass breeds.

The cheapest method of making pork is to procure early pigs and keep them until about nine or ten months old.

The best method of putting up pork that I have ever found is, first, to let the hog remain long enough after slaughtering for the animal heat entirely to subside. This I consider of great importance. I then cut and salt in sweet barrels, with Turk's Island salt, ground, and I use three-fourths bushel to the barrel, and then make a strong pickle, and fill up. For hams, immediately after cutting up, I pulverize saltpetre and rub the fleshy parts thoroughly with this powder, and let them lie 12 hours. I then pack them in barrels, using one-fourth bushel of the same kind of salt as for pork. I then make a pickle, by using one gallon of the best of molasses, ¼ lb. saltpetre, and as much salt as will dissolve. After lying long enough for the salt to strike through, I smoke with corncobs, and find it to be nice.

APPLES.

The cultivation of fruit is receiving increased attention, and it is found that the raising is a profitable business. The best varieties for winter use are the Baldwins and Russets, and are found to keep sound longest when kept as cool as can be and not freeze.

GRAPES.

Some few individuals have bestowed some attention to the culture of the grape with good success. I saw, the past fall, four vines of the white Sweetwater, which had been cultivated four years, and upon the four vines I should judge there were 4 bushels of very fine grapes. Some clusters would weigh upwards of a pound.

JOHN SAWYER RAYMOND,
Cumberland County, Maine.

THOMAS EWBANK, Esq.,
Commissioner of Patents.

Meadville, Franklin Co., Miss., Dec. 25, 1850.

Dear Sir:—Your agricultural circular of the 26th of August was handed to me some time since. I have delayed responding to your queries, to collect the desired information. I proceed to give you the result of my imperfect inquiries in relation to the agricultural interests of this section of country.

We raise no wheat, barley, or rye. Cotton and corn are the principal productions. In fact, we raise so little of any thing else, that we call these our only crops. We generally plant about half and half, that is, one half corn, the other half cotton. The number of acres thus planted is about 16 to the hand. So one hand is said to cultivate about 8 acres of cotton and 8 of corn. The average crop per hand is about 200 bushels corn, and about 5 bales of cotton. An acre planted in corn seldom produces more than 25 bushels; nor does an acre of cotton often produce more than $\frac{5}{8}$ of a bale. There are lands that produce more; but there are others that produce less. Five-eighths is about a general average. The weight per bale is averaged at 400 lbs.

We sell nothing but cotton; that is, we carry nothing else to market. For this we get 13 cents per lb., making $52 per bale. The cost of conveying to market is about $2 for each bale. When we sell cotton, we purchase supplies for the next year. Those supplies consist of meat, for which we pay $13 per bbl., negro clothes, sugar, coffee, &c. &c. The whole *outlay* for each negro, per year, is about $25, not including herein the costs of corn, potatoes, garden vegetables, &c., consumed by each. The whole cost of supporting each negro here cannot be less than $35 per annum.

When we plant 8 acres of corn to the hand, we seldom fail to make plenty. But cotton, for a few years past, having borne a good price, many of our farmers have gone half mad; planted nearly all their land in cotton, and but little corn. The consequence is, that corn has become scarce, and commands a high price. I paid, on the 20th, almost as high as $1.25 per bushel. We could, were we not so absorbed in cotton raising, raise hogs enough for

our own meat. A few sensible old farmers do this, but the most of us abandon every thing for the sake of cotton, and so we depend almost entirely upon the more northern States to furnish us with this most essential commodity. We might raise many things we do not—and which we will not, so long as cotton brings its present price. Sheep would flourish here with a little attention; but, as it is, we raise but few for home purposes. Cattle and horses might be raised to advantage. We raise no horses, at least so few, that we may count them none. We are indebted to Kentucky and the other more northern States for our supplies of horses and mules. Great droves are brought down and sold among us every year. The price, this year, for a good working-horse is no less than $100; for a good mule, $120; saddle-horses of the best quality at from $200 to $275.

Milk-cows sell for $10 and $12 per head. We have but few, and make no cheese—a little butter for family use. Cattle are little or no trouble: they raise themselves. We seldom feed them, and it is only the cows and oxen we ever feed, and these only in the severe winter months. We use oxen principally for drawing our cotton to market. Four yoke can draw 6 bales. Oxen sell for $35, $40, and sometimes as high as $50 per yoke. We gather a little crab-grass for hay, and sometimes a few pea-vines, with which, together with the shucks of the corn, we feed the oxen while working. We also give them a little corn. We gather all the blades from the corn for fodder, upon which we feed the horses during the working season.

The usual mode of feeding horses while working is to give them 15 good ears of corn and 2 bundles of fodder three times per day—morning, noon, and night. We employ, or ought to employ, one horse to every hand. It is not much trouble to make corn, but cotton requires a great deal of ploughing and hoeing. We are compelled to work it all the time we are not engaged in our corn, to make a good crop. When we have finished working it, we then have to pick it. No time is then to be lost. This keeps us busy until near Christmas.

We raise no tobacco or hemp: we raise a little rice about in the wet spots; also a little sugar-cane, more for the curiosity of the thing than for any real profit. We never make sugar. We sometimes mash the cane and make a little molasses for home use. A negro man hires for $135 per annum; a white man for about $15 per month. Overseer wages range from $20 to $25 per month.

We manure nothing but corn. This we manure with cotton-seed, at the rate of one double handful of seed to the hill of corn. Corn thus manured will produce large and fine ears in the poorest land.

Yours, &c.,

D. C. GRAHAM.

Clarksville, Red River County, Texas, Dec. 16th, 1850.

Sir:—The "Agricultural Circular" issued from your office, and bearing date the 26th of August, was this day handed to me by the postmaster at this place.

In the outset, it may not be improper for me to remark that agriculture, *as a science*, is with us yet in its infancy. Very little attention is paid to the quality or kind of seed, except cotton; and such a thing as fertilizing

or manuring land is never dreamed of. This county possesses a variety of soils—from the black, sticky land in the prairies, to the light, sandy soils of the "barrens." Wheat is grown to some extent—none, however, for transportation; the crop being generally about sufficient for home consumption. The time of seeding is from the 1st of October to the 15th of November; though many plant much earlier than that—say, 1st of September, provided there are seasonable rains enough about that time to cause the wheat to come up early. This, however, is not generally the case, inasmuch as the beginning of our autumn is unusually dry.

Thirty bushels are the average yield per acre.

We harvest from the 15th of May to the 1st of June.

During a residence here of several years, I do not remember having ever seen a single bushel of wheat in the least damaged by weevils.

CORN.

The most esteemed variety with us is the yellow. The average yield is about forty bushels per acre. The land is first prepared by very deep ploughing, and is most generally planted in drills. Very little is consumed in feeding hogs. Oats, barley, rye, peas, and beans grow well, and yield abundant crops. Oats and rye yield astonishingly. The cost of raising cattle amounts to nothing more than the time consumed in marking and branding. Cattle are penned once a fortnight and salted, which is necessary to keep them gentle.

Cattle require no feeding. In spring and summer, the grass upon the prairies furnishes excellent grazing, and the wild rye, cane, and winter-grass in the bottoms, furnish food during winter.

From 8 to 10 dollars is the usual price of cattle, at 3 years old. The value of good cows in spring is $10—in fall or winter a trifle higher, say $12. The cattle here are all native animals. Many are turning their attention to cattle-raising. Two thousand head or upwards are annually shipped to New Orleans. They are shipped down Red River, which is the northern and eastern boundary of this county. The cost per head of shipping to New Orleans is from 5 to 6 dollars. The price of prime fat beef, butchered, is from 2¼ to 2½ cents. On foot, any quantity can be purchased at 2 cents. *Hogs.*—We have several different breeds and crosses. The Irish graziers, I think, do best here—at least, they are, among hog-raisers, preferred to any other. Hogs are never fattened upon corn, from the fact that they fatten themselves in the woods, upon acorns, which, of course, is the cheapest method of producing pork and bacon. Bacon or pork fattened upon acorns is considered by many as being much sweeter and better flavored than that fattened upon corn. There is one objection, however, which I have to mast-fed pork, and that is, the lard is never so firm, hard, and good, as that of hogs fattened upon corn. The acorns of the post-oak and over-cup trees are considered the best mast for hogs.

COTTON.

The average yield of clean cotton in the prairies is about 1000 pounds, and about the same in the wooded uplands and barrens. In the river bottoms, however, (Red River and Sulphur,) where most of our large cotton plantations are situated, the yield is from 1600 to 2000 pounds per acre.

It must be borne in mind, however, in connection with this fact, that the bottom lands of Red River, as cotton lands, are not surpassed by any in the world.

RICE

Has not been cultivated to any extent, most of the crops having been planted merely for experiment. I am fully satisfied, however, from the specimens which I have seen, that rice can be successfully cultivated upon our uplands and prairies. Potatoes, both Irish and sweet, grow well. I do not now recollect the average yield. The best manure for Irish potatoes is rotten chips, decayed wood, straw, &c. The best system of planting is in rows—cutting the potato—leaving an "eye" upon each piece. Sweet potatoes yield more planted in hills. With us, the Spanish potato is the most prolific.

Very respectfully yours, &c.

FRANK H. CLARK.

Erie, Pa., December 27th, 1850.

MR. EWBANK—*Dear Sir:*—I have received your agricultural circular, asking for information on various subjects. I shall endeavor to answer some of them.

First, *Wheat.*—The kinds most esteemed here are those that ripen early—as the Mediterranean and Etrurian. This last is a wheat I received, a few years ago, from the Patent Office. It is a very superior wheat in every respect. It is a bald, white chaff, white wheat—ripens early. I sow two bushels per acre—plough but once, 8 or 10 inches deep—go over with the large cultivator—sow, and harrow in.

The yield per acre is on the increase. I average about 25 bushels per acre—this year, over 25 acres. I have no one settled rotation of crops; sometimes we sow on clover-sod, once ploughed—then corn, then barley and seed down. At other times—first corn, then barley, then wheat and seed down. Wheat is worth $1 per bushel.

Corn.—The most esteemed variety here, is red-cob gourd-seed. The best system of culture is to drill and work entirely with the cultivator.

Rape.—I have cultivated this crop for several years, and find it very profitable.

The soil for growing rape on should be rich and clean. A thorough old-fashioned summer-fallow is probably the best for the rape crop. It should be sown the last of August—three pints of seed to the acre. It will be ready to cut in the last of June, or first of July. We cut it with large reaping hooks, and lay it in small bunches to dry, for eight or ten days. Then, with a large cloth spread over the hay-ladder, we proceed to haul in, and thresh with a flail immediately. The greater portion of the chaff is to be raked off, and the remainder left, with the seed, one or two weeks, on the barn-floor to dry.

It will produce from 30 to 50 bushels per acre. I have raised the highest figure. It is worth $1 per bushel in Erie.

Rape-straw is useless, except for manure.

These few remarks I submit. Truly yours,

ROBERT EVANS.

Potosi, Grant Co., Wisconsin, December 24th, 1850.

Sir:—I have the honor to acknowledge the receipt of your circular of August 26th, 1850, through Hon. O. Cole, and, in answer to your inquiry in relation to fattening pigs, &c., I beg leave to communicate the result of a careful experiment.

In October last, I selected from my stock two pigs, of the same age, and, apparently, alike thrifty; one, however, weighed 260 pounds, the other 247 pounds. Immediately after being weighed, they were put in different apartments of the same house, kept dry and warm, and fed with great care for 40 days; then they were again weighed, and slaughtered. The heaviest pig was fed with cornmeal, mixed stiff with cold water; the other, with shelled corn, with plenty of pure water for drink. The one fed with meal consumed 425 pounds, and gained 63 pounds, live weight; the pork weight, or weight after dressing, was 267 pounds. The other ate 308 pounds of corn, and was found to have gained only 33 pounds, live weight, his pork weight being 231 pounds. By subtracting the pork weight from the live weight, the amount of offal is ascertained, which, in this experiment, proved a fraction less than one-fifth of the live weight. If one-fifth be deducted from the amount each pig gained, we then have the true gain, in pork weight, produced, which was *six and three-fourth* pounds for every 56 pounds of meal, and *five* pounds for every 56 pounds of corn.

The pigs were a cross between the Byefield and Berkshire, the best and most profitable breeds—the corn, yellow-dent, or Cleveland, a variety held here in great esteem.

Very respectfully yours, &c.

J. E. DODGE.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Fair Water, Wisconsin, December 12th, 1850.

Sir:—Let me inform you, and the public, a little concerning my method of building a fence. Not that I am presumptuous enough to believe that I have hit upon the *best* method under all or even most circumstances; but because I imagine that it may be of "real practical value" to *some* farmers in this wide-extended Union. In the first place, I get rails as long as convenient, say from 10 to 12 feet, and strew them, 7 in a bunch, so that the ends will touch the whole length of the line on which the fence is to be built. (If the rails are small, more will be necessary.) Then, I prepare stakes and caps, after the following manner, viz.:—The stakes I cut 7½ feet in length, and split them out, say 4 inches square. Sharpen one end for driving into the ground—the other is fitted to a 3 or 3½ inch auger-hole, about 3 feet from the end. These should be made of the most durable timber to be had. Charring the part driven in the ground will prevent decay wonderfully. If your fence is 6 rails high, you will need ⅓ as many stakes as rails. The caps should be cut 20 inches in length, and split-out 6 inches wide by 1½ or 2 inches thick. The distance between the inner edge of the holes should be about 5 inches. You will need one-half as many caps as stakes, and, perhaps some more, unless you have good timber, and are care-

ful to try every stake, so as to be sure that none are a size too large. After making a good bench to stand upon to use the sledge, you can commence putting down the stakes: about 2 feet in the ground will be sufficient. If the ground is hard, a "crowbar" will be necessary to make a hole. You will lay the bottom rail as you desire the stakes. When you get the fence 5 rails high, put down the cap, laying the top rail above it. For 12 feet rails, about 3 feet "worm" will be sufficient, or 18 inches from the centre each way to the outside stake. Do not make the fence entirely straight; for, in that case, the rails will slip by at the ends, and your fence will be all in a heap in one year. A fence 6 rails high, built in this way, is better and more secure than one 7 rails high, of old-fashioned zig-zag fence. The difference in the number of rails required is nearly enough to pay for the stakes and caps; but the greatest advantage is, that the winds will not affect it, and it is an "impassable barrier" to cattle, &c. When built, it looks farmer-like, and, indeed, it is so. It may be no new "wrinkle" to many—yet, I presume, there are thousands who have never thought of it. Without adding more, let me subscribe myself a friend to improvement.

Yours, &c.,

H. B. EVEREST.

THOMAS EWBANK, Esq.
Commissioner of Patents.

Golden Grove Tea Plantation, Greenville, S. C., Jan. 9th, 1851.

Sir:—I have received your favor of the 7th ultimo, together with a copy of a communication from Mr. Frank Bonynge, for which I am much obliged. The history of China is an imperfect record of past events. The curiosity of the public mind, in its researches, is soon bewildered and lost in its attempts to unravel the fabulous and unauthentic stories of a semi-barbarous nation. No satisfactory accounts relative to the time when the use of tea was introduced into the empire have been transmitted to us. It appears, however, that it was in use during the Tsing dynasty, in the latter part of the fourth century, and how much earlier no record shows.

During the Tang dynasty, in 780, a duty of 10 per cent. was levied upon all tea brought from beyond the mountains, where it grew spontaneously. During the reign of Moor Tsand, 824, this duty was raised to 50 per cent. in order to replenish the imperial treasury; not an unusual excuse for taxation in more modern and enlightened times. In 1023 to 1063, large factories were established, and tea became an article of extensive commerce in the empire. The use of tea was introduced into Thibet in the ninth century, when Chang-loo was sent thither by the emperor, as ambassador; for, at that early period, there seems to have existed a greater freedom of international association than at present. The Thibetians, observing the ambassador's preparation of tea in his tent, inquired about its qualities. "It is," said Chang-loo, "a drink which relieves thirst and dissipates sorrow." A recommendation of greater accuracy could hardly have been given by any Chang-loo of the present day. A disposition to possess this sorrow-healing beverage soon manifested itself, and a distribution of several packages, just sufficient to establish the use and create a demand, was made by the ambassador among the courtiers.

In Japan, the use of tea was known in 810. The plant was not introduced until 815, when two Buddhist priests brought some young shoots from China. These flourished, and the use of tea became general in Japan.

Soon after its introduction into England, in 1657 to 1666, the tea-leaf was a court luxury, and sold as high as $25 to $45 a pound. In 1678, the English East India Company commenced the importation of tea, as a regular article of commerce, and the annual quantity received from China at that time, amounted to 4713 pounds. For ten years, from 1700 to 1710, the importation amounted to less than 800,000 pounds, or an average of less than 80,000 a year. It was still a luxury confined to the wealthy, and used in small quantities, with cautious economy, out of cups containing about a table-spoonful. Since that period, the quantity of tea imported from China into England amounts to between 50,000,000 and 60,000,000 pounds annually.

As we indulge curiosity in looking back for many centuries, and inquiring by what means, at what time, and under what auspices the tea-plant was introduced into foreign nations, so our posterity may have the same curiosity to learn at what time and under what circumstances it was introduced into our own country; nay, we need not wait for posterity to disclose a kindred curiosity of this inquisitive character. It is now actively alive and looking for an authentic solution. As the history is short, and may gratify the wishes of some, and perpetuate a record of facts, and especially as I am now in health, and hold the evidence in my hands which has not been communicated in writing, I feel it of sufficient importance to give to the public.

An unbelieving world would call the introduction of the tea-plant into the United States as an article of commerce, an accident. A Christian would call it an unequivocal mark of the special providence of God, leading to events unlooked-for, unexpected, undesigned, and so entirely alien from any human calculation, that the weakness and humble condition of the agents employed would seem to be inconsistent with a favorable result of such a great undertaking.

I have an only child, a daughter, born in London, who married the Rev. Edward K. Maddock, in Sydenham, near London, where I then resided, in 1840. In 1842, he was appointed, by the East India Company, a chaplain in the British army in India. He sailed with his little family in November for Calcutta. After a short residence at Barrackpoor, about sixteen miles from Calcutta, the bishop appointed him to the military station at Meerut, north-west provinces of India. The heat of the plains (latitude 29 to 30 north) was so oppressive, that Mrs. Maddock was, for the security of her health, advised, during the summer months, to remove to the Himalayas Mountains, about eighty miles from Meerut. By the English overland-mail, we corresponded monthly. On the 30th of October, 1846, she wrote me a familiar letter, which I received in New York, the 22d February, 1847. In that letter she gave me the first intelligence I had received of the formation of the tea plantations in the north-west provinces of India by the East India Company, as follows:—"In my next, I shall be able to tell you something about the tea now growing on these mountains. We are going to stop with the superintendent of the botanical gardens, Dr. Jamison, on our way homeward: he has promised to let us taste the tea. We hear that it surpasses the China tea, and is likely to become a most valuable speculation to the East India Company. The present tea plantations are near Almarah.

Some of the tea has been sent to London, and sells there for $1.50 the pound." Thus, we see, that we owe the whole of American tea enterprise to the familiar letter of a lady, writing without the slightest idea and wholly unconscious that it was designed to be the instrument of conferring upon the United States the greatest agricultural boon recorded since the introduction of the cotton-plant. No sooner had I perused that letter, than the idea burst upon me, that if the tea-plant could be successfully cultivated upon the mountains of Himalaya, as well as in the territories of Assam, there could be nothing in the ordinary course of vegetation to prevent its growth in the United States. From that hour, I devoted myself to the introduction and cultivation of the tea-plant in the United States. I did not seek the employment. It sought me. After three years' labor, and repeated disappointments, I have the satisfaction to inform you that I consider the greatest and most trying difficulties surmounted. The year 1849 was fatal to my imported tea-plants and tea-nuts. All perished in transportation; but Providence directed events to a different issue the last season. My plants and nuts came to hand in the finest possible condition, and I have availed myself of the blessing by greatly extending my plantation of the first quality of tea-plants, and still continue to enlarge the boundaries of tea-nut cultivation. The art of transporting plants and nuts securely, so great a distance, was entirely unknown, because without a precedent. All failed in their various attempts to accomplish the end. Final success rendered it absolutely necessary for me to devise a plan of operations more likely to prove successful. In this attempt, my views were carried out in China, and crowned with signal and complete success. The nuts arrived late, and but few germinated before summer closed. Those few, together with a good proportion of the tea-plants, thrive remarkably well, and now look strong and healthy. Experience has taught important lessons, and more are to be learned in this interesting art, before we can bring tea cultivation to its ultimate perfection in this country,

Your obedient servant,

JUNIUS SMITH.

Courtland, Lawrence County, Alabama, December 4th, 1850.

Sir:—Accompanying this, I send replies, in part, to questions contained in a circular from the United States Patent Office. The replies are not of a character to add much to our reputation as agriculturists or planters, and it is to be regretted that our country is not managed in a manner calculated to reclaim the lands and make them as productive as they no doubt would be under an improved mode of culture, which they are undoubtedly susceptible of. Should the communication be acceptable to you, I shall be gratified.

Wheat.—The crop is too uncertain, and is only cultivated principally for the use of those who have produced it. The early varieties are preferred—average yield, 10 bushels per acre: no preparation previous to sowing: the wheat is sown broadcast, and turned under with a one or two-horse plough, as the disposition of the person seems to suggest, and left to its fate. The crop is rarely interfered with by the fly. It is sown in September, and harvested in June: price $1.50 per bushel.

Corn.—The large varieties of white are preferred—product per acre,

30 bushels; culture very defective, as it is generally where cotton is produced. Much the greater proportion is fed in the ear; no attention paid to collecting manure—the cotton-seed not used for planting, being the principal dependence for manuring in the hill of corn in the exhausted portions of the land.

Oats.—There are three varieties cultivated here—the rupple, very productive, and well adapted to cotton plantations, as it is later than any other variety; the black oat, several weeks earlier, and very desirable because of its great weight and yield. The common, a mixture of white and black. Quantity of seed per acre, one to one and a half bushels is generally sown—yield, 15 to 20 bushels per acre. The small yield is to be ascribed to the careless manner of putting in the seed, which is generally on rough land and ploughed in.

Barley not cultivated; only used for winter pastures. Rye is similarly used.

Peas.—A very valuable crop, excellent for all kinds of stock, and the best reclaimer of land known to us. The vines that are left, after feeding the peas, improve the land in a remarkable degree: product per acre not known, as they are rarely gathered in a manner to ascertain.

Clover and Grasses.—The land here is admirably adapted to clover, if once firmly set. The yield is abundant, and the land much improved by the deposit of leaves and stalks, as it is rarely, if ever, saved as hay. The herds-grass and orchard-grass are best suited to the soil and climate, as far as ascertained.

Dairy.—But little attended to, as there is no market convenient for any surplus.

Neat Cattle.—Not desirable, unless for milk and beef to a limited extent; are considered injurious to the land when pastured during the winter.

Hogs.—Those most highly esteemed are the Berkshire, grazing, and Woburn, or a mixture of the best stock of the country with the above kinds. The course pursued in producing pork here is by no means cheap, requiring feed until slaughtered; the corn and attention required generally being of more value than the pork. The climate is changeable, and it requires strict attention to save meat that will be palatable.

Sheep and Wool.—Sheep thrive well, if attended to, and produce good wool, and a fair yield. Peas and vines are superior, for winter food, to any thing I have known them to be fed on. The county is well adapted to produce all that sheep require, and, with proper attention, there is no doubt that the raising of sheep and wool would be profitable.

Cotton.—Average yield of clean cotton per acre, 180 pounds. Cost of production, 6 cents per pound, when the same hands cultivate the usual quantity of land in corn, say 7½ acres. Crops are best grown in rotation, with cotton, corn, and peas; the next year in oats. The rust is by no means common here. Preventives against the army and boll worms: the army-worm has appeared but one season, and then so late as to do no injury: the best preventive against the boll worm is to make the ridges for the cotton in the early part of winter, so that the worm that makes the fly may, if not destroyed the next summer, be exposed to the cold, and be killed. Early ploughing for cotton at all events is considered preferable, and, if done as above-mentioned, much will be gained. In making the ridges, 4 or 6 inches are the usual depth for ploughing with two-horse ploughs.

The subsoil plough has not been used to any extent, but is spoken favor-

ably of by those who have used it. Cotton-seed is very superior as a fertilizer, if rotted, or the vegetative principle destroyed. Cotton lands can best be improved by planting corn and peas after cotton, and oats after the corn and peas, leaving the oats on the exhausted portions for stock. It is believed that cotton does not require deep tillage until the land becomes too close to admit of the absorption of water from the rains to promote vegetation.

Root Crops and Potatoes.—Irish potatoes are an uncertain crop. Sweet potatoes are cultivated to a considerable extent: product large, but rarely measured. Turnips are the principal root crop. It is produced by most of our farmers, but not offered for sale.

Fruit Culture.—The climate is better adapted to the production of the peach than any other kind of fruit. Apples are to be met with of good quality, but the trees are short-lived, and would not be profitable unless in particular situations. There is more attention paid to orchards now than formerly. No grapes, unless to a very limited extent, and no wine.

Very respectfully, your obedient servant,

JOHN M. SWOOPE.

Hadley, Hampshire County, Mass., January 6th, 1851.

Sir:—An agricultural circular from the Patent Office, bearing your signature, has been sent to me by the Northampton postmaster, requesting me to contribute to the objects of which it treats. Feeling deeply my incapacity to answer, satisfactorily to myself, even the questions contained in the circular, much more that of giving information to the agricultural community, is my only apology for thus postponing a duty, which, although difficult to perform, yet has a bearing upon a great cause that has ever been to me most interesting and precious.

In enumerating and remarking upon our staple crops in this section of the Connecticut River valley, permit me, sir, to call your attention to one which is not noticed in your circular, but which ranks among the first in our list of staple crops. I refer to broom corn, the culture of which is by no means confined to this valley. The virgin soils of the West furnish their hundreds of tons annually for the manufacturers here. A rich, warm, alluvial soil is best adapted to this crop. It can be raised any number of years in succession, on the same ground, without a deterioration of soil or crop, provided 8 or 10 ox-loads of good rotten manure are placed in the hills at the time of planting. The average product per acre is about 700 pounds of brush and 70 bushels of seed. The cost of labor on an acre is about $15. Very few crops leave the soil in better condition.

The kind of Indian corn raised here is yellow and eight-rowed. Average product per acre, 40 bushels. Cost of production per bushel, 50 cents, exclusive of rent. A good system of culture, and one which is approved by our best farmers, I will try to state in a few words. The land intended for corn should have been turf the preceding season, and, if clayey or wet, should be ploughed in the autumn. In the spring, 15 ox-loads of well-fermented manure should be spread on the inverted soil and well harrowed in. Mark the ground at right angles for rows, so that the hills may be 3 feet apart each way. Plant, about the middle of May, 4 kernels in each hill, with a moderate handful of ashes. Ten bushels will suffice for an acre, and

they may be applied in the hill, on the hill, or near the young plants, after the first hoeing, with like effect. Cultivate and hoe three times at suitable intervals. The corn should be cut at the ground about the middle of September, or after it has become a little hard, and put up in stacks to dry. In about 4 or 6 weeks it will be ready to draw off and husk. In feeding to hogs, there is, doubtless, a saving of grain in grinding and cooking; but to make pork quick, cooking is needless.

Oats are sown principally with grass-seed, two bushels per acre producing about 30 bushels. All land that is heavy, or that was stiff sward the year previous, should be ploughed in the fall rather than in the spring. Oats are considered very exhausting, and, if possible, had better be dispensed with in a rotation of crops. The quantity of hay cut per acre varies from 1 to 4 tons. Two tons are considered a good crop. When land produces but one ton, it is ploughed for corn, or, if it is low ground, where corn will not flourish, it is ploughed in August, dressed with compost manure, sowed with a peck or half a bushel of timothy, nicely harrowed and rolled. The ploughing is done after haying, and the next year we have a crop greatly improved in quality and quantity. This method is strongly recommended by the Massachusetts Ploughman.

If any of the above remarks may be considered of any worth, they are at your service. I have applied to Prof. Snell, of Amherst College, for answers to the questions relating to the weather, which I hope to enclose in this sheet. A copy of your Report will be gratefully received and highly prized by,

Sir, your's truly,

THEOPHILUS P. HUNTINGTON.

Answers to the questions under the head of "Meteorology," as derived from the journal kept at Amherst College, by Prof. E. S. Snell:—

Temperature from observations of twelve years, 1839–1850, inclusive.

	Highest above zero.	Lowest below zero.
Range	86° to 94°	6° to 22°
Average	91° 15′	13° 54′

Time.

Range, from June 17 to July 30. From Dec. 13 to Feb. 24.
Average, July 13th. January 19th.

Mean Temperature.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
	°	°	°	°	°	°	°	°	°	°	°	°	°
	23.49	23.89	33.36	45.90	56.09	65.71	70.75	69.27	59.74	47.20	38.09	27.11	46.72
Highest Mean	29.73	30.50	37.69	51.95	59.47	68.35	72.42	71.54	65.48	50.46	44.08	34.24	48.02
Lowest Mean	13.93	16.48	24.52	41.63	52.71	61.60	68.23	67.10	57.22	42.81	33.49	21.53	44.21

Fall of Rain, from observations of fourteen years, 1837–1850, inclusive.
Mean depth, (including melted snow.)

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
	Inches.												Aggte.
	3.04	2.63	3.21	2.83	3.96	3.39	4.16	4.71	2.94	4.23	3.52	3.95	42.58
Greatest fall	5.80	4.88	5.73	4.82	8.72	5.18	9.56	9.38	6.38	9.45	5.77	6.41	55.59
Least fall	0.99	0.99	1.69	0.57	1.91	1.53	1.95	1.53	0.47	1.78	1.90	0.96	34.92

Sweet Home, Bond County, Illinois, January 1, 1851.

Sir:—Being favored with a circular from your office, soliciting information respecting the agricultural interests of our region, I give the following in reply.

Wheat.—The red chaff, velvet, and golden straw, are the most common varieties here, and have been cultivated ever since the first settlement of the country. These varieties are of course nearly run out, producing only 10 or 15 bushels per acre, and are generally sown among corn at the last time of ploughing, or later, as the case may be. More recently, the May wheat has been introduced with some promise of success. Its advantages are, 1st. It is much earlier than other kinds, say from 1 to 3 weeks. 2d. It has a small growth of straw, but stiff and firm, and on these accounts is less liable to rust or fall. The rust and want of proper tillage are the greatest obstacles in the way of a good crop. With this variety, the former is avoided, and the latter may be learned. As this kind is ready to cut before the rust strikes it, it might, with good management, be made a sure crop. The Hessian-fly rarely troubles us, and the weevil never. Of the last-named wheat, I would further remark, that though the straw is short and the head small, the grain is uncommonly heavy and plump. I raised a few bushels of it last year, which was cut with Hussey's reaper. Several of our most experienced farmers came to witness the operation of the machine, and assisted in taking up the grain, and said it was the heaviest wheat they ever handled for the quantity of straw. I threshed the same with one of Emery's overshot machines, the only one of the kind here, and is generally believed to be the best in use. I sold what I had, for seed. Its weight was 67¾ pounds per bushel. Others raised of the same kind, which weighed about the same. As to the number of bushels it will yield per acre, I do not know, but my opinion is, that on the same ground, and with the same culture, it will produce as many bushels and more weight than any other kind. No pains have been taken to introduce other new varieties here. The general practice of farming is to plant and sow the same seed on the same ground, from year to year. If a man puts in a piece of meadow, he will cut the grass for 15 or 20 years without manuring, scarifying, or reseeding. There are farmers here who have planted corn on the same ground ever since they commenced farming, say for 25 years, without changing their seed or ploughing deeper than at the first. Corn, corn, without manure, is their rotation. Corn is their motto from beginning to end, barely splitting the rows. And should any one presume to do differently, he would be denounced as a *book*-farmer, and thought to be incapable of getting a living by farming. Still, there are some who are bold enough to differ from them, and who, after their grounds have become a little worn, venture to let their plough in to the depth of from 6 to 10 inches, and thus, without manure, obtain double the crop of their old-fashioned neighbors. This, and the use of machinery, they look upon as an innovation, while they pursue their old course, and manage to raise corn enough "to do them," and are content. Cost of raising corn is from 5 to 10 cents per bushel, and sells at St. Louis (our principal market) for from 20 to 60 cents per bushel. Wheat brings from 60 cents to $1 per bushel. Our corn is generally fed to stock in a raw state, and unground, with no other crib than the ground for them to eat from. And, when taken into the stomach

of the animal in this hard state, it affords but little nourishment, much impairs their digestive organs, and, of course, must produce disease in many cases. As I omitted to say what I intended to in relation to the best mode of putting in wheat, I would here remark, that I believe a summer-fallow of clover, or fresh-broke prairie, is indispensable to the raising of a good crop. It may do to sow after other crops, if the land is well manured, for the ground must possess the elements of wheat—otherwise, none will grow. In the next place, it should be put in with the wheat. Drill or plough as soon as the 1st September; and, in the spring, it should be well harrowed and rolled. This I consider to be good wheat culture.

Oats are extensively cultivated, and produce from 28 to 40 bushels per acre. They are worth from 25 to 50 cents per bushel.

Rye yields from 10 to 20 bushels per acre, and sells for 37½ to 50 cents. It is a sure crop, though but little raised.

Beans are not extensively raised here, though they do well. They are worth from 50 cents to $1.25 per bushel.

The castor-bean is raised here, and produces from 10 to 25 bushels to the acre. They are worth from $1 to $1.25 per bushel.

Grasses of all kinds do well here, producing from 1½ to 3 tons per acre, according to the land, cultivation, &c. The best fertilizers for meadows are leached ashes, and barn-yard manure, spread on evenly as a top dressing. No land retains manure longer than ours, or gives a more bountiful return for the expenditure. The kinds of grass preferred here are red clover and timothy, mixed. Quantity of seed per acre, ½ a bushel of timothy, and 4 quarts of clover. Hay can be raised, cut and put into the mow or stack, with the aid of Hussey's grass-cutter and a good revolving rake, for $1 to $1.50 per ton. The usual price here, is $4 to $5 in the stack; but, if pressed and taken to St. Louis, (about 50 miles,) it brings from $15 to $30 per ton. The prairies are our pastures, and our cattle come from them to our barns, in the fall, as fat as they well can be, and this, too, without any expense, except for salt. The produce of the dairy from the prairie is equal, if not superior, to the best tame pasture, making richer milk, and as much or more butter and cheese for the year. Our dairies are managed only in connection with stock raising, and with nothing but dry food in winter. The value of butter and cheese per year, for each cow, is from $15 to $20. Treatment of milk and cream, various; also the mode of putting down butter for market. The best plan I have found for large dairies is to set the milk for butter in a cool cellar, of the right temperature, without scalding, and take off the cream, which I churn in a large rocking-churn, and, after the butter comes, which is in from 10 to 20 minutes, draw off the buttermilk, and dash in a bucket of cold water, which, by churning a few minutes, helps to wash out the buttermilk; after which, we work in the salt, and set it away for a few hours; then work it over the second time, adding more salt, with saltpetre and loaf-sugar, and pack away in firkins made of mulberry or ash. This will keep any length of time in any clime. Average price here, 10 cents. At St. Louis, 20 cents. Cheese, from 8 to 10 cents.

Neat cattle cannot be raised till three years old for less than from $6 to $7 each; but, with suitable blue-grass pasture for winter feeding, might be raised for one-half that sum, and would attain a larger size, consequently bring a better price. Average price now from $10 to $15. I can raise a horse or mule to the same age (three years) for less money than I can a hog

or a steer; though Durham cattle, possessing every advantage in market, without any additional cost of raising, might do better.

Sheep and Wool.—The raising of sheep is the most profitable branch of husbandry in which the farmer of this region can engage One hundred per cent. can with certainty be realized in the raising of wool and lambs, on any amount of investment the farmer has a mind to make, with proper care, shelter, and blue-grass pasture for winter feed. I can raise a pound of wool of any description as cheap as any other man can a pound of pork, and I can raise a pound of fine wool as cheap as I can a pound of common, coarse wool. The different breeds here are the Merino, Saxon, Cotswold, Blakewell, and Southdowns, the latter of which, with their crosses, I prefer. All sheep grow larger here than in the old States, and will yield more wool per head with the same care, and will produce a greater number of lambs in proportion to the ewes. Experience has proved this most conclusively; also that the same kind of sheep will produce a finer quality of wool in this or any other mild climate. This is the fact respecting furs; for those coming from warm climates are much finer and richer than those from cold ones, as every fur-dealer knows. The same that causes the fur to grow finer will operate the same on the wool of the sheep. As to mutton, every man knows that a large fat sheep or lamb is better than a small poor one. Sheep will get fat on the prairies in summer, and, if changed to blue grass and timothy in the fall, will remain so all winter, with good shelter. Hemp and tobacco can be raised to any extent here, but are not. The same may be said of roots. Potatoes do well here, both sweet and Irish, when the latter do not fall a prey to the bugs.

Fruit.—In this line we stand No. 1, both as to quality and quantity. Notwithstanding the extent and number of our orchards, new ones are being planted every year. The raising of fruit is the surest source of profit to the farmer in this section. Our market nor crops do not fail more than once in ten years, and the net profit is often above two hundred per cent. So long as our market remains as good as it has been for the last ten or twenty years, we shall not need to make other arrangements to dispose of our fruit; but if this should fail, we should still find it profitable to raise it for stock. Thus far, I have answered as well as I am able, and I believe accurately, although not as fully as I could have wished. Yet, if I have subserved the interests of agriculture, it is most cheerfully submitted, for you to dispose of as you may think proper, while I remain

Your most humble servant,

SAMUEL COLCORD.

Cinnaminson, Burlington Co., New Jersey, 12th mo. 18th, 1850.

Sir:—Having received one of your agricultural circulars, soliciting such information as might be useful in the Annual Report to be issued from the Patent Office, I proceed to give some account of the crops and management of farm-land in this locality. The kind of crop most profitable for cultivation in any section of country must depend, not only on the soil and climate, but the convenience of conveying the same to market. The extensive cultivation of perishable articles is necessarily confined to the vicinity of large cities, and situations having steam communication with them. Our land being a sandy loam, is very favorable for the early ripening of fruits

and vegetables, and, situated within a few miles of Philadelphia, and having railroad communication with New York, fruits and other perishable crops, gathered one evening, may be served out in either market the next morning. As a consequence, the farmers in this section of New Jersey find the raising of fruits and vegetables for the great markets, Philadelphia and New York, to be the most profitable use to which their lands can be applied, and vast quantities of such produce are daily despatched, by cars, steamboats, and sloops, during the market season. Whole fields of asparagus, peas, melons, cucumbers, &c. may be seen during the season of cultivation, resembling vast gardens. Strawberries, raspberries, and grapes are now coming into general cultivation, and bid fair to remunerate the husbandman richly for the labor bestowed thereon. Rotation of crops is not strictly adhered to, yet the system most approved is to turn down a sward or grass lay for corn; if it is old, and likely to be infested with worms and troublesome insects, it should be ploughed early, so that the frosts may kill all vermin that would otherwise prey on the kernels when deposited in the hill. We usually plant about the first of the fifth month, and cultivate the yellow gourd-seed variety, which yields an average of about fifty bushels per acre, costing thirty cents per bushel for cultivating, which cost varies inversely with the yield per acre; a strong argument in favor of plenty of manure and careful treatment. The practice of cutting up corn near the roots before it is quite ripe, while the blades and stalks are full of nutritious matter, is coming generally into favor, thereby saving a large amount of fodder, which is rapidly wasted when unprotected from the bleaching winds of autumn. The stalks from an acre of ground, when properly cured, are considered equivalent to a ton of hay for feeding stock. Grinding the grain, and sometimes crushing the cob with it, is greatly preferred to feeding whole; but little steaming or cooking of corn for stock has been practised. Oats and barley are sometimes sown the next spring after corn, but more frequently the ground is occupied with potatoes, peas, melons, and other garden vegetables for market.

Potatoes.—The failure of this crop in many parts of the country, where the land is clayey and tenacious, thereby holding the heavy rains in immediate contact with the tubers, until the hot sun, coming upon them while thus thoroughly saturated with water, completes their destruction, drying and baking the ground over and around them, so as to exclude the air, that, if they were so near ripe at the time as to retain their form until harvested, they soon give way after being exposed to atmospheric influence. The same cause that has heretofore prevented the cultivation of the more delicate sweet potato on heavy land, now operates against the Mercer or Irish potato, which seems to have degenerated in vigor, and has at length yielded to those adverse influences (which the sweet potato never could withstand) that had been imperceptibly, though no less certainly, impairing its constitution for many years previous. And sandy loam,—open and porous soils, that allow the excess of moisture to pass off freely from the plants, whereby severe storms act like gentle showers, merely to moisten the roots and invigorate the plants, and the genial rays of the sun thereafter meliorate the land, to the great benefit of the growing crop,—being the most certain land in which to grow the potato successfully, has induced our farmers to cultivate them almost to the exclusion of oats and barley; and fifty or sixty acres may be seen growing on single farms. Potatoes are invariably planted in drills, about thirty to thirty-six inches apart, manured with

stable manure, or marl, which is abundant, and containing portions of lime, potash, &c., is preferred by many to any other manure, and can be obtained at the pits at 25 cents per ton, the additional cost depending on the distance to which it is carried. Planting is generally done during the fourth and fifth months, using about 10 bushels of seed and 15 horse-loads of manure or marl per acre. The digging commences in the ninth month, and is hurried through, so as to seed the same ground with wheat before cold weather sets in. Average yield per acre, 100 bushels; cost of producing, 30 cents per bushel; current price for last season, 60 cents per bushel. Hauling the crop to market, or to some navigable stream from whence they can be shipped to any of the seaport towns, commences soon after digging, and is continued at intervals through the winter and spring, as they are wanted for transporting to distant markets.

Sweet potatoes are also extensively cultivated, in the lightest and most sandy portions of this district, (stiff, unyielding soil being unfit for them.) The yield per acre, and market value, about the same as the Irish potato; but greater care in cultivating, storing, and preserving them through the winter is necessary, they requiring a temperate and uniform atmosphere, both as to warmth and moisture.

Wheat.—The third year of the rotation is usually devoted to wheat, which had been sown at the close of the second, after the crop of that year, such as potatoes, melons, cucumbers, &c., had been removed. Many varieties have been introduced here, as having some particular merit, which entitled them to preference over others; but of those that have been subjected to the test of several years' cultivation under all circumstances, the "blue stem" has the preference among white, and the "Mediterranean" stands unrivalled among red wheat, being early and less liable to suffer from rust, fly, and other maladies to which the cereal crops are subject. Seeding is mostly done in the tenth month, and harvesting near the first of the seventh month. The seed is generally sown dry, as it comes from the winnowing-mill, though it is sometimes soaked in strong pickle with beneficial results. Average product per acre, 20 bushels; cost per bushel of cultivating, 80 cents; market value, $1 to $1.12 per bushel.

Rye.—This crop is not cultivated to any great extent here. Three pecks are usually sown in the ninth month, and about 12 bushels harvested per acre in the latter part of the sixth month following. Price, 75 cents per bushel. The straw is valuable to farmers. Being long and pliable, it is convenient for many purposes; but this crop has disappeared rapidly from our fields since the introduction of Mediterranean wheat, which succeeds admirably on light sandy soils, yielding 50 per cent. more in quantity than rye, and commanding 33 per cent. more in price.

Grasses.—Clover and timothy are the principal grasses in cultivation, and are usually sown on young wheat or rye, about 1 bushel of each on 8 acres of land. Lime, marl, and plaster are extensively used, and are excellent fertilizers for meadows and pastures. Wood-ashes, guano, and poudrette are sometimes used with beneficial results. There might be a great saving of useless experiments, if farmers, instead of groping in the dark, and waiting years for the results that might be produced by different treatment, could bring to their aid the light of science, to show by mere analysis the constituent properties of their soil, and the kind of application necessary to supply the exhaustion caused by various crops.

Peas and Beans are only cultivated as vegetables, and are picked and sent to market while green.

Hogs.—Several breeds have been introduced and much mingled together; the Berkshire, however, has held a prominent place in the estimation of the people. Hogs are kept principally for the purpose of consuming the slops and offal produce of the farm, which would otherwise be wasted, but may thus be turned to good account, and, by keeping the sties well supplied with litter, muck, &c., large quantities of manure may be obtained: further than that, the price of corn will not warrant the feeding of swine on a large scale.

Root Crops.—Carrots and beets have been cultivated as a field crop to some extent, but, not meeting the expectations of the people, they have been mostly discontinued. Turnips are still largely cultivated, both for market and for feeding stock, yielding about 500 bushels per acre.

Dairy Husbandry.—Milk and butter are the principal articles sold from the dairy. One hundred and fifty pounds of butter to each cow is a fair yield for the year, worth 20 cents per pound. There is a limited demand for milk, which commands 3 cents per quart in the neighbourhood, and 6 cents in Philadelphia market.

Fruit culture is claiming increased attention. Many people have found that a few trees of the best selected fruits, planted around the house and yard, have yielded more profit than as many acres of land cultivated with ordinary crops. If proper care be taken in the transplanting and after-treatment, for a few years, until the trees get established in their new location, it will be fully repaid by the additional quantity and quality of fruit produced. The holes to receive the roots should be excavated larger and deeper than merely sufficient to let the roots in without bending, and rich earth or prepared soil should be filled in, so as to plant the tree as deep as it previously grew in the nursery. All wounded or bruised roots should be pared with a sharp knife; the tree should be held upright, and the roots extended in their natural position, and covered carefully with pulverized soil, which should be brought in contact with every fibre, so as to leave no hollow or cavities among the roots. A little water should be poured on, so as to settle the earth and retain moisture around the roots, after which throw on a little more surface soil, to prevent its baking, and leave a little hollow to hold the rain. Stake each tree and tie it carefully, to prevent the wind from shaking it, which greatly retards the young roots from striking in the ground. Young orchards should be cultivated for several years, and have vegetables grown therein, in preference to grain or grass.

The *Plum* is a valuable fruit, and, being liable to several maladies, particular care should be taken to cut off and burn the large black bunches when they appear on the limbs. One of the best preventives against the depredation of the curculio is to allow swine to have free range among the trees, as the insect is found to avoid places so dangerous to its offspring, which is contained in the fruit that has been attacked on the tree, which falls prematurely to the ground, and is destroyed by the hogs feeding below.

Peaches are of easy culture, but the trees should be examined two or three times during the season, and all worms removed from their roots, which may be readily indicated by the gum oozing from near the surface of the ground.

Quinces succeed best in a rich, mellow, moist soil, and, when thus situated, produce abundant crops of fine, sound fruit. Coming into bearing early, they bid fair to be a very profitable market-crop.

Grapes.—The native varieties are the only ones to be relied upon for open

or field culture; and the Catawba, Isabella, and Elsinburgh have proved the most valuable for that purpose. Poles or stakes have heretofore been used for supporting the vines, but what is greatly preferred now, is a cheap and substantial trellis, made by erecting upright posts, eight feet high, and extending wires (No. 11) from one to the other, for the tendrils to cling to, and support the fruit and foliage.

Raspberry.—The cultivation of this fruit is claiming much attention, and many thousands of them are annually planted. Having over six acres devoted to their culture, I have found them to be one of our most profitable crops. There are many highly esteemed varieties, but, so far, the red Prolific, a native kind, has answered better than any of my imported ones. It is a medium-sized berry, great and certain bearer, and very hardy, needing no protection during the severest weather. The Antwerps and Fastolffs bear superior fruit, but the canes are so tender as to require careful protection from the sudden changes in the weather, or they may be so injured as to affect the crop. A moist situation, free from the extreme of drought or surface water, is desirable. The rows should be six feet apart, and the plants three feet apart in the rows, and cut down to within a few inches of the ground, soon after being planted, that the roots may become well established before they are required to supply nourishment for a long top of green foliage; otherwise the exhaustion of sap would be greater than the amount furnished by the roots in their new situation, and many of the plants would wither and die at the approach of dry weather. After the bearing season is over, the stems that have borne fruit should be cut down to the ground, to give strength to the young suckers which are to produce fruit the next year, as those which have once borne will never bear again. All superfluous suckers should also be cut out, and not more than five or six of the strongest stems retained in each hill. Stakes or rails are not necessary in field culture for sustaining the plants, but where they are too slender to bear their own weight, the tops of several may be tied together, whereby they will support each other. The ground should be thoroughly cultivated, and have a coat of manure every fall. A new plantation should be formed every seven or eight years. The fruit is picked in small square boxes containing one pint each, at a cost of one cent per box, mainly by the wives and children of laboring men in the neighborhood, who, instead of being a burthen to be supported by the head of the family, as heretofore, can each of them earn from fifty cents to one dollar per day, being quite as much as the principal himself generally obtains. The extensive use to which the raspberry is now applied in making jams, pies, tarts, sauces and preserves, raspberry cordial, syrup and wine, which "is a good reviving draught in ardent fevers," in addition to the large quantity used as a dessert fruit, creating a great demand, and the supply being limited by the number of pickers in each neighborhood, maintains a price much above the cost of growing them.

Strawberries.—This delicious fruit being so extensively cultivated as a field crop, yielding as many bushels per acre as corn, and commanding six times the price in market, scarcely needs any direction at this time for its culture; but, as some may wish to engage in it, who are not acquainted with the manner of growing fair crops of large berries, I will merely state the mode of cultivation that I most approve, after several years' practice. The ground should be prepared as for other crops; if not already rich, make it so by manuring: mark the rows four feet apart, and set the plants twelve

to fifteen inches distant in the rows. If the plants are of the female variety, put one hermaphrodite to every ten of the others, entirely rejecting the purely male or barren plants, which produce no fruit, but blossom and grow vigorously, and soon overrun and crowd out their more fruitful neighbors; some hermaphrodites bear abundantly themselves, and are amply sufficient for all the purposes of fertilization, by which treatment every plant may bear a perfect berry to each blossom. The beds should be kept mellow and free from weeds the first season, and the runners carefully distributed over the ground, so as to form the beds with regularity, after which but little culture is needed. A new plantation should be formed every four or five years. Plants are less liable to suffer from drought when set in the spring than in the latter part of summer, though either is a suitable time for transplanting.

I have extended this communication beyond my first design, and have no doubt embraced much superfluous matter, which, I hope, thee will curtail, and publish only what may be useful. Believing that the great interest of agriculture will be advanced by collecting and disseminating information on all matters pertaining thereto, I shall be happy at any time to contribute what little lies in my power towards the general good, in part return for the benefits which I have received from the experience of others. With sentiments of the most perfect regard, I subscribe myself,

Very respectfully, thy friend,

WILLIAM PARRY.

West Chester, Pa., December 24th, 1850.

Sir:—In answer to the queries contained in your printed circular, issued the 26th of August last, I beg leave to confine my remarks, at present, principally to the cultivation of the apple.

The apple will, for a long time, continue to occupy a prominent position among the fruits cultivated in Pennsylvania, either for home consumption or exportation. Its adaptation as a table dessert, in connection with its cooking qualities, and the great length of time to which its season of usefulness may be prolonged, will secure it a prominence in the culinary catalogue that no other fruit can easily reach. But a very limited quantity has hitherto been cultivated in this section of country for exportation; the principal markets for the surplus, over the consumption of cultivators, are the inland and river cities and villages. The proportion of arable land in eastern Pennsylvania under apple culture is about 2 per cent.; it might be 10 per cent. with profit to the cultivator. At least, three-fourths of the trees are past the prime of bearing, with a rapid tendency to decay. Most of the old orchards were planted for the purpose of making cider and apple-brandy, and the varieties of fruit selected with special reference to those objects. The association of horticulturists, by holding exhibitions, and awarding premiums, have, within a few years, given an impulse to the growing of such varieties of the apple as are better suited for the table; hence, plantations have been lately made with reference to that object; but a small proportion of which has yet come into bearing. The ball of improvement is, however, in motion, and continues to roll. Experience has demonstrated that certain varieties of the apple cultivated with the greatest success in

one section of the United States are very inferior in other locations. This remark holds good in relation to most other fruits. It will hence be seen that it is impracticable to give a list that would be worthy of cultivation in all parts of the country. It is better, therefore, that those who are about to make apple plantations should select such varieties as are known to do well in their own vicinity for the larger part of their orchard: at the same time, plant a smaller proportion of other varieties of standard reputation elsewhere. If any of these should prove to be inferior, the heads can be top-grafted, and the variety changed, with a loss of only two crops. I would here remark to the young orchardist, that the nursery-man, from the nature of his profession, is always the best able to give advice in relation to the varieties most worthy of cultivation in his vicinity. A northern slope is the best for an orchard; any deviation from this should be easterly or westerly; a southern aspect should be avoided, if possible, as the very worst. Although some compositions of soil are better than others, I would say to every landholder, plant on such soil as you have; but avoid, if possible, a low, flat, or wet location, unless you first give it a thorough draining. Most horticultural writers advise the digging of holes, 3 or 4 feet square and 2 feet deep, in which to plant trees; the holes thus dug being first filled with rich earth or well-prepared compost. This preparation will undoubtedly give the trees a rapid growth for a few years, while the roots are confined to the narrow space prepared for them; but when they are compelled to go beyond those narrow limits in search of food, I fear the consequence will be like a spoiled child, fed on "roast-beef and plum-pudding" at home, and then sent out into the cold world to seek a living for himself. I do, however, most earnestly recommend subsoil ploughing. Let the subsoil of the whole field to be planted be loosened and pulverized as deep as possible. Without this preparation, the good results contemplated by digging deep holes are, to my mind, very questionable. I planted an extensive apple-orchard, a few years ago, without even the advantage of subsoil ploughing, which I very much regretted, there being obstacles in the way, which I was unable at the time to overcome. To make amends, as far as possible, for the want of subsoiling, I planted my trees *on the top of the ground.* A boy held the tree upright, while a man, with a shovel, covered the roots with such topsoil as he could collect convenient to the tree, raising a mound about the stem, to the usual depth of planting, extending the slope some 3 or 4 feet from the tree, the ground having first been well ploughed in the usual way. I did not lose one tree to the hundred—they not only lived, but grew; and their growth, so far, is quite satisfactory. There is great difficulty in making a fair estimate of the quantity of apples that may be grown annually on an acre of ground—the age of the trees, the mode of pruning them, the number on an acre, the composition of the soil, its culture, the aspect or slope of the ground, with other contingencies—all have a bearing on the productiveness of the orchard. A good distance to plant apple-trees, is 33 feet apart each way, which will place 40 trees on the acre; this disposition will give the trees sufficient room when they come to full growth; but if the planter wishes to devote his ground principally to the growth of apples, and bring it into profit as soon as possible, he may plant his trees 1 rod apart each way, which will put 160 trees on an acre. When the heads grow so large as to become too close, cut out every other tree in each row—not the trees opposite each other in the adjoining rows; but so as to leave the orchard in the quincunx order. When they again

become too close, cut out one-half of the rows alternately, which will reduce the number to 40 trees to the acre, and give ample room to expand and develop their utmost fruit-bearing qualities. If apple-trees are planted on good ground, and well cultivated, they will commence bearing on the fourth or fifth year, (some varieties sooner than others.) The tenth year, they will yield 3 bushels to the tree, which (if planted 1 rod apart each way) will be 480 bushels to the acre. The fifteenth year, they will yield 5 bushels to the tree, which will be 800 bushels to the acre. This may be considered a fair average crop for 20 years afterwards. If apples are worth 20 cents per bushel on the tree, (which is a very moderate estimate,) then an acre, planted as above advised, will produce $96 the tenth year, and $160 annually after the fifteenth year. All that a farmer gets for his apples on the tree, over 5 cents per bushel, is clear profit. To produce these results, it will not do to merely plant an apple-orchard, and let it take care of itself. The ground must be cultivated and manured, the trees must be annually pruned, caterpillars and other insects destroyed; in short, such a course of culture is needed as will keep the trees in good health, with plenty of nourishing food at their roots. The crops grown between the trees, before they come into bearing, will remunerate all this labor and expense. Indian corn and root crops are the best for orchard culture; cropping with small grain is injurious to fruit-trees. Red clover is the only grass that ought to be permitted to grow in an orchard; and it should be ploughed under, the second or third year.

Pruning.—Minute directions for this operation cannot be clearly given, without occupying too much space. A few hints, in outline, will be sufficient for the purpose. Pruning should commence with the planting of the tree, and should be continued, more or less, every year. The upper surface of the head of the tree should be in the shape of an open umbrella: this will permit the rays of the sun to reach the fruit, without which it would not ripen well. The upright centre branches must be shortened, or "headed back," the outer side-branches be encouraged to take a horizontal position, and the whole head should be so thinned that light and air can have a free circulation. The facilities incident to hand-picking the fruit should also be kept in view when shaping the head of the tree by pruning.

Some pomologists prefer winter, and others summer pruning. My experience is in favor of winter pruning, for the purpose of thinning-out and shaping the head of the tree. Suckers or offshoots may be removed at any time—the sooner the better. When young trees are well cultivated and manured, they sometimes become too growthy, at the expense of fruit-bearing. To remedy this, it is well to go over the trees, in the months of July or August, and, with a sharp knife, cut off about one-third of the present year's growth of each shoot: this will check the growth of the tree, and induce the formation of fruit-buds for the next year's crop. Summer pruning for any other purpose cannot be recommended, as the removing of any part of the foliage has a tendency to check the growth of the tree. By pruning every year, small branches only are cut, which soon heal over, without any deleterious effects from the wound.

There is nothing to be gained by those who wish to plant fruit-trees, to begin by propagating and raising their own trees. It is better to go to the nursery at once and buy those they want, of the proper size for transplanting, which will be five years in advance of trees they would grow themselves. Five years advance in the fruit business is a matter of some im-

portance. If the above remarks are deemed worthy of a place in your Report, and prove to be of any use to the community, the writer will be amply compensated. Very respectfully, &c.

A. MARSHALL.

Canandaigua, N. Y., December 27th, 1850.

Sir: —In answer to the Agricultural Circular which you were pleased to send me, I beg leave to make the following remarks:—

Wheat.—The varieties most in use are Soules and white-flint, the former is sown to the greatest extent, but the latter has many recommendations. It will make at least an equality of flour, and, being less liable to shell out, there is less loss in harvesting; and, if there should be a scarcity of help, it can stand until quite ripe without any damage. On this last account, I have sown no other for several years. Where much wheat is grown, I think it advantageous to sow both kinds. Since I have grown the flint-wheat, my average has been about 25 bushels per acre. I am not an advocate for early sowing, but from the 10th to the 20th of September, I consider the best time. By sowing late, I think I stand a better chance to escape the ravages of the fly. I formerly limed my seed, but of late have sown without any preparation, and, by being particular in selecting clean and pure seed, have not found it necessary to pursue any other course. Where I fallow, I plough three times; but I put in a great portion of my wheat with one ploughing after clover. My favorite rotation, where the nature of the soil will allow, is, 1st. Corn or roots, on which I apply all my manure; 2d. Barley or oats, at the same time seeding-down with clover; 3d. Clover, mowed or pastured; 4th. Wheat, with one ploughing. Under this system, there is no dead year for fallow; my crops are good and my land is not exhausted. Of course, this system will not apply in all soils, for, on some, fallow seems absolutely necessary; but such I do not consider the most profitable to cultivate. Average price for 1850, at our nearest market, one dollar per bushel.

Corn.—I have tried several varieties, and consider the large eight-rowed yellow the most profitable. My manner of cultivation is as follows, viz.:— As soon as the manure is spread, I plough it under, and, without any harrowing, plant along the furrows made by the plough, taking every fourth furrow, which gives a little over 3 feet between the rows, and I allow the same distance between the hills. I would say that this plan requires good ploughing and favorable soil. As soon as the corn is up, I cultivate between the rows lengthwise, and drop some plaster on each hill. In a short time, I go through again with the cultivator, first cutting down all weeds with the hoe, which grow among the corn, and the next and last time I go through with the plough, throwing up the soil to the plants and covering up all weeds, which will as effectually kill them as cutting them up with a hoe. After this, I go through with a hoe and draw the soil about the plants, and release their leaves when fastened down by ploughing.

Hogs.—I only fatten enough for my own use, and this I do by throwing to them the corn on the cob, which is not, perhaps, the most economical way, but it is the least troublesome. For my horses, cattle, and sheep, I grind corn and cob together.

As to the increase of corn from the application of manure made from corn fed to hogs, I cannot speak; but, having made a small experiment on manure applied to ruta baga, I will here state the result. November 17th, 1842, measured three drills of ruta baga, 30 feet long and 30 inches apart, and weighed the product, with the following result:

From common barn-yard manure,	45 lbs.	of roots,	=	$435\frac{35}{60}$ per acre.
" hen-house	do.	99	do.	= $958\frac{18}{60}$ "
" rotted hog	do.	108	do.	= $1045\frac{24}{60}$ "

From this I think it fair to infer that a very material increase of the corn crop might be expected from the use of hog-manure.

Oats.—Average crop per acre, about 50 bushels. Quantity of seed per acre, 4 bushels.

Barley.—Average yield per acre, about 35 bushels. Quantity of seed per acre, 3 bushels.

Peas and *Beans* I consider the least exhausting.

Clover and Grasses.—Average quantity per acre, about 2 tons.

Plaster is undoubtedly the best fertilizer for clover; but I do not think it has an equal effect on other grasses. In laying down meadows, the kind of seed should be suited to the land, for, on low, wet land, red-top is considered to be the best, while, upon higher land, timothy is more suitable. I am now using orchard-grass with clover, on account of its ripening so much earlier than timothy, which is not fit to cut when clover ought to be. I have tried rye-grass, but did not like it.

Sheep and Wool.—My sheep are all Southdowns. They are not profitable merely for wool-raising, but their mutton is very superior, and we are now brought near the Eastern markets by railroads. I consider them the most profitable sheep to keep. I have known them to be sold before 12 months old for slaughtering, in our village, at $3 per head. I generally rear as many lambs as I keep ewes.

Root Crops.—For many years, I have been a successful cultivator of roots. My greatest crop of mangel wurtzel was 1346 bushels per acre, and of ruta baga, 946. I consider mangel wurtzel, sugar-beets, and carrots to be the most profitable. I do not think there is any decided increase in these crops, nor will it ever be profitable to grow them to a very great extent in this climate, owing to the necessity of having them protected during our long and severe winters. It is very different in England, where the winters are so mild that the greater portion of the crop is consumed upon the ground. I look upon corn as the grand substitute for roots, and as the farmer's main dependence to carry him through our long winters. Having noticed your queries, so far as I have a practical knowledge of the subjects, and being invited not to confine myself strictly to those queries if any other subject bearing on agriculture should suggest itself to me, I take the liberty to call your attention to a subject which I consider of the first importance to agriculture. I allude to a thorough system of draining. The wheat crop in this section of the State of New York is the principal one upon which the farmers depend in order to meet their cash engagements. Any plan by which this crop can be materially and permanently increased must be of great benefit to a large class. Now, I consider the greatest enemy to the wheat crop to be a surplus of surface-water. Nearly every spring we hear farmers complaining that their wheat is winter-killed, and in almost every instance of this kind which has come under my personal observation,

I have felt assured that draining would have proved an effectual remedy. I know that upon my own farm, where wheat used invariably to heave out, a thorough underdraining has effected a complete cure. On many parts, which were mere swamps, and too unsound to bear a horse, I now grow my best wheat, and those fields which were formerly so wet as to be the last in a condition to work in the spring are now dry the earliest. To carry off mere surface-water much may be done by judicious ploughing and furrowing. Of so much importance do I consider it that the surface-water should have a free egress, that I am not satisfied merely to draw a plough where it is necessary, but I follow with a spade or shovel and clear out the furrows completely, and, after the first rain, I go to see if there be any lodgment of water, and if so, lower the trench so as to give more fall. As to ploughing, I have suffered so much inconvenience in getting the surface-water from my land, owing to the custom, so prevalent, of deeming it absolutely necessary, if a field had been ploughed north and south, that the next ploughing should be east and west, that I have, for a number of years, given up cross-ploughing. I have my fields ploughed into lands of 30 feet wide, taking care that the furrows run with the natural inclination of the land. By adopting this plan, I obtain a good fall for all the surface-water. After all this attention in carrying off the top water, there will remain lands to a very large extent unfit to bear wheat without underdraining, and a still larger extent which might be greatly benefited by it. It would be difficult to lay down any general rule for draining, as different situations require different treatment as to direction and depth of drains. It is a disputed question, whether deep or shallow drains are best. I advocate the former, never having had to repent of making drains too deep. My drains have varied from two to three feet in depth. In some instances, I have drained every dead furrow, which, according to my plan of laying out my lands, would be 30 feet apart. This is rather an expensive operation, but it has proved very satisfactory, as the nature of the soil, which was before a stiff clay, has undergone a great change for the better; and the field, from being the wettest and most difficult to work, has become the driest on my farm. With regard to the best materials for laying drains, stones, if abundant on the farm, (and, of course, it would be an object to remove them from the surface,) make good and permanent drains. If you have not stones at hand, drain-tiles are the best and cheapest material for that purpose. These are now made of good quality, and at a reasonable price, at Waterloo, Seneca County, N. Y. In this county, draining is comparatively a new operation, but I am convinced it is one which may be very beneficially pursued, and several farmers in this vicinity have entered into it with spirit, and with perfect satisfaction as to results. If, by these imperfect remarks, I shall be the means of calling attention to this most important subject, and of having it introduced into the next Agricultural Circular, when more minute and satisfactory statements may be elicited, my object will be attained.

I am, sir, your ob't serv't,

CHAS. B. MEEK.

Aurora, Cayuga County, N. Y., 12th mo. 18th, 1850—lat. 43°.

Friend:—Thy circular of the 26th 8th month last is before me, and in answer—

Wool-growing is most profitable for persons who are obliged to hire laborers; but for those who work for themselves, a variety of agriculture is more profitable. Cost per lb. for growing fine Saxon Merino wool is about 28 cents per lb., and sells for 38 cents per lb.; average weight of fleece 2½ lbs. Cost of growing Spanish Merino wool, 22 cents per lb.; sells for 31 cents per lb.; average of fleece, 4 lbs. It is not any more, if as much expense, to raise Spanish Merino wool per pound, as to raise common coarse wool. The Saxon Merino is much the finest wool, but not as strong constitution as Merino. The wethers of the latter are worth 50 per cent. more than Saxon; are equal to Southdown for mutton. My flock is very fine Saxon, but I am crossing them with Merino, such as I kept years since. One ton of hay will produce 28 lbs. of Saxon Merino, or 36 lbs. of Spanish Merino wool. One ton of hay is sufficient for 11 Saxon, or 9 Merinos, during our winter-foddering of 17 weeks. Merinos will eat coarser provender than Saxon; the former are rather more profitable than the latter, and 40 per cent. more profitable than such sheep as were common in America previous to the introduction of Merinos. The proportion of lambs annually reared, to the number of ewes, is, of Saxon Merino 40 per cent., of Spanish Merino 60 per cent., if they have lambs at two years of age; but better not have them until three years old; the flock will be stronger, and produce more wool.

The soil of this county is a rich, calcareous loam, producing good crops of wheat, corn, or grass. The above statement is estimating land worth $1 per acre, annually, subject to taxes and repairs, or double that sum, if in grain culture. Laborers, $125 per year, and board.

I have kept a flock, averaging two thousand Spanish or Saxon Merino sheep, during the last twenty-five years. The foot-rot was introduced from Saxony 17 years since, and, after applying for years several caustics to their feet, &c., and other things, as directed in European and American books, with great labor, without success, then commenced giving the sheep about three ounces flour of sulphur, (cost in New York 3½ cents per pound,) in one peck of fine salt, each week during warm weather, which, if I had known years ago, would have saved me some thousands of dollars, for it effected a permanent cure without labor.

Respectfully, HUMPHREY HOWLAND.

Jeffersonville, Fayette County, Ohio, December, 1850.

Sir:—In compliance with a request made in your Agricultural Circular of the 25th August, 1850, I have thought proper to make a few suggestions relative to the culture of the Irish Potato. Having experimented considerably on a limited scale, for some years past, in the above business, I give the result, hoping it may be of advantage to others. By planting in the month of May, say towards the latter part, in ordinarily rich, loose soil, with the addition of a little long manure, prepared by ploughing and harrowing, plant in hills three feet apart each way, with from two to three small potatoes in each hill, and cover four to six inches deep. Till, by

ploughing each way, without adding fresh dirt to the plants, but elevate the soil on all sides above that first made, (i. e. above the hill,) and thin to three or six stalks to the hill, just before they bloom. By this process, the yield is 400 bushels per acre. But the same process, in rich sod land, with the same manure, may make a yield of at least 600 bushels per acre. The varieties are the pink-eye and red meshannock.

H. CREAMER.

Westmoreland, December 28th, 1850.

Sir:—Having received a circular from you soliciting information upon the subjects therein named, I will proceed to give my opinion in answer.

Wheat.—There are three kinds in use—the bald, which averages about 25 bushels per acre; Black Sea, average 25 to 30 bushels, and red-chaff, average 20 bushels per acre. Time of sowing, September 20th; harvest, July 20th. Preparation of seed, wet and roll in plaster; quantity per acre, 2 bushels. We plough but once, depth 6 inches. Yield diminishing. Rotation, corn, oats, and wheat. Remedy for the weevil, air-slaked lime sown while the wheat is in the blow. Average price in market, $1.13 per bushel.

Corn.—Varieties, yellow and white; average crop, 50 bushels per acre; cost of production, 40 cents per bushel. The best system of culture is to plough the ground in the fall, and in the spring furrow it and dung in the hill with compost. Best method of feeding corn, have it ground and scalded. The manure of 10 bushels of corn made by hogs, if carefully saved and applied in the hill, will add 5 bushels to the crop.

Oats,	average yield per acre,	40	bushels;	quantity of seed,	3	bushels.
Rye,	"	"	"	35	"	"	"	$1\frac{1}{2}$	"
Peas,	"	"	"	20	"	"	"	1	"
Beans,	"	"	"	20	"	"	"	$\frac{1}{4}$	"

Peas may be considered a renovating crop.

Clover and Grasses.—Average product per acre, 2 tons; best fertilizer, manure; kind preferred, timothy; quantity of seed per acre, $\frac{1}{2}$ bushel; cost per ton to raise, $3.

Dairy.—Average product of butter per cow,	150	pounds, cost	$12\frac{1}{2}$	cents.
" " cheese "	300	" "	7	"
Average price of butter per pound			14	"
" " cheese			6	"

Neat Cattle.—Cost of rearing till 3 years old, $23; usual price, $25. Value of dairy-cows in the spring, $30, and in the fall, $18. Number of pounds of beef produced from 100 pounds corn, is $19\frac{1}{2}$. A given amount of food will produce more meat in a native than in an imported animal.

Sheep and *Wool.*—This branch of husbandry is profitable, and on the increase. Cost of coarse wool per pound, $18\frac{3}{4}$ cents, and that of fine, 31 cents. One ton of hay will produce 15 pounds of wool. Large sheep are more profitable for mutton, and small fine-woolled sheep the best for wool. The proportion of lambs to that of ewes is two-thirds. The best breed of hogs is the Berkshire. The cheapest method of producing pork is to feed scalded meal. One hundred pounds of corn will produce 24 pounds of pork.

Potatoes.--Average yield per acre, 200 bushels; cost of production, 12½ cents per bushel. Varieties, red-field and pink-eyes. Best manure is a compost of muck, lime, and dung.

Fruit culture is receiving increased attention. Apples are a profitable crop, but, when compared with potatoes, are not profitable to feed. The best mode of preserving manure is to keep it under cover till wanted for use, then draw it out and plough it under as soon as possible. The quantity used per acre is about 20 loads.

ROBERT WATERMAN.

Morrissania, Amherst County, Va., December 28th, 1850.

Sir:—I had wished to see the agricultural part of the Patent Office Report before replying to your circular, that I might see what I had written last year, and avoid unnecessary repetitions; but, as I understand it will not be published in time for that purpose, I have concluded to delay an answer no longer.

Wheat.—The varieties cultivated in this county are the white-flint, white blue-stem, the early and late purple-straw, the white-bearded, Mediterranean, and Zimmerman. The May wheat, both white and red, and the red-shuck, which were formerly cultivated here, have been almost entirely superseded by the first-mentioned varieties. The white blue-stem was more productive the past season than any other cultivated by me. This fall, I sowed a part of my crop with early purple-straw and Zimmerman wheat; as these varieties are highly spoken of by those who have tried them. The average produce per acre in this county, the past year, cannot be estimated at more than 10 bushels. We usually sow on high land from 1 to 1½ bushels per acre, and on low lands from 1½ to 2 bushels; and we commence seeding about the 25th of September, and complete this operation about the 10th of November. Fallow ground I usually plough twice, corn and tobacco land only once, and cover with the harrow. The ploughing is usually from 6 to 8 inches deep for wheat. The yield per acre I consider as on the increase, for a much better system of agriculture is practised by our farmers; more attention is paid to manuring the land, and more guano, plaster, and other fertilizers are used than formerly. My system of rotation in crops on high land, is the six-field: 1st, corn or tobacco; 2d, wheat or oats; 3d, clover; 4th, clover, partially grazed; 5th, wheat; and 6th, clover; and on my low grounds, the three-field: 1st, corn or tobacco; 2d, wheat; 3d, clover, taking care to graze the clover, after harvest to closely beat down the weeds and prevent them from destroying the young clover. The best protection against Hessan-flies, is to make the land rich, and sow in the month of October; and that against weevils, is early threshing and grinding. The price of wheat the present year, in Lynchburg, has been from 90 cents to $1 per bushe.

Corn.—The only variety I have cultivated for many years is what is called the "double-eared," a white grain, between the gourd-seed and the flint. The best system of culture for corn is to make the land rich, plough deep, plant early, and not work the corn after harvest. I usually plough my low land in beds of 21 feet wide, on each of which I make 5 rows, plant the corn 2 feet apart, and leave 2 to 3 stalks in each hill. My low land produces from 5 to 15 barrels (of 10 bushels of ears) to the acre, and my

high ground about 5 barrels. The average of the county is not more than 4 barrels per acre. There is certainly great economy in the feeding of stock by having the corn ground, for I am satisfied that from one-fourth to one-third will be saved by this operation. As to cooking food for stock, I am unable to give any information.

Oats.—This grain will yield about double that of wheat to the acre; but as the poorest land is generally selected for oats, the average yield may be put at 15 bushels.

Rye.—The Poland rye, a new variety, is said to be much more productive and hardy than that previously grown; but I do not cultivate this grain, in consequence of the difficulty of keeping it from mixing with my wheat.

Peas and *Beans* are only raised for family use in this vicinity, and barley not at all.

Clover is regularly sown on all my land after the small grain crop, and I save largely of the hay: indeed I consider it necessary for my farming operations. This, and my corn-fodder, are the only kinds I make use of. I suppose the clover yields from 1 to 3 tons per acre.

Dairy husbandry does not receive much attention, as we are satisfied if we have plenty of milk and butter for family use. We make no cheese. It costs us but little to raise our cattle, as we have a sufficiency of straw-fodder and shucks to feed with, and we keep no more than we can feed with advantage. We never feed our sheep except when the ground is covered with snow, which, in our coldest winters, does not exceed a few weeks. Wool-growing, therefore, might be profitable, if it received sufficient attention, as the expense of keeping sheep is inconsiderable; we keep only enough, however, to clothe our families and to furnish us with mutton and lambs.

Hogs are generally raised by keeping in the woods during the winter and spring, and feeding them on corn till about the first of June, when they are turned into the clover-fields, where they remain until the wheat is removed, and they are then suffered to glean the wheat-fields; and about the first of October they are put up in pens, and fed with corn, pumpkins, &c., till December, when they are killed. This we consider the cheapest method of producing pork. I have but one suggestion to offer as to the best method of curing bacon-hams, and that is, to remove the bone from the point of the ham to the hip-bone, and round it off. It is under this bone that the ham usually spoils, and this removal is attended with but little trouble, and the appearance but little changed.

The crops which we grow in rotation to maintain the fertility of the tobacco land, are wheat and clover. It is also desirable, in the three-field system, to put that part which was in tobacco one rotation, in corn the next, so that the land will not be in tobacco but once in six years. This I consider necessary, as the food of the tobacco-plant differs from that required for grain. To prove this, all kinds of products grow well after tobacco; and wheat after it will yield twice the quantity that it will after corn on similar land. The average yield of tobacco per acre, may be estimated at about 700 or 800 pounds on old land, and on new at about 500 pounds. The reason why old lands produce the largest yield is, that they are generally manured. Sometimes, however, much larger crops are made, for I have grown as much as 1200 pounds per acre. Root crops are not on the increase, as we only cultivate them for family use, except a few for

market. Fruit culture is receiving increased attention among us, for orchards of apples, peaches, pears, apricots, &c. are being planted, of the best varieties, which produce well, unless nipped by an "untimely frost;" and I have no doubt that apples will be exported from Virginia in a few years, instead of being brought from the North. Grapes are also grown of many varieties, and produce well, both native and foreign; the former, however, succeed the best; and among these are the Norton seedling, a fine bearer, and is a most delicious table grape.

Manure.—My plan for making manure is to place my pens for wintering stock near the land intended to be manured for corn or tobacco. Into these pens I haul all my corn-stalks, and feed with straw, shucks, &c. The cattle eat as much as they want, and trample the remainder under their feet. In the spring, this manure is spread and ploughed under, and the stable manure is used in the same manner. That which is made in spring, summer, and fall is either spread as a top dressing on clover or wheat in the fall and plastered. I have spread lime on my land, but never have been able to discover any benefit from its use. I use plaster freely and with beneficial effects. I spread it weekly over my stable-manure heaps, also over the manure when spread. It is sowed on clover and used with seed-corn. The use of guano has just commenced in this county, and gives general satisfaction.

Respectfully yours,

RICHARD G. MORRISS.

Warsaw Prairie, Kaufman County, Texas, December 26th, 1850.

Sir:—My absence from home for some time past has prevented me from answering the interrogatories propounded in your circular until the present time, and I shall now have to beg you to excuse me for the brief reply which I am compelled to make. From the newly settled state of the country, it is almost impossible to make a correct report of the amount of products now raised in this and the adjoining counties, for it is now only a short time since when "nought else was heard but the yell of the Indian and the tramp of the buffalo." As to the capacity of our soil and climate for the production of cotton, corn, wheat, and other cereal grains, as well as that of many other agricultural products, I think it cannot be excelled; in short, as was stated in the Report of the Trinity Convention, which met at Huntsville a year or two since, and which was composed of delegates from the whole Trinity Valley,—"The rich black prairie country of the Upper Trinity, in an agricultural point of view, must necessarily become the garden of Texas. The immense grassy plains of prairie and woodland, the cane-bottoms, with never-fading verdure, and the immense fields of wild rye, green in midwinter, all show that the constant labour and toil of man are not necessary in order to rear stock of any kind, for they grow and flourish without his care."

Wheat.—Most of that formerly grown here has been of the bald varieties. Very little of any bearded variety has as yet been introduced among us. I regreted exceedingly that we had not sown the "Mediterranean," or some other good variety of bearded wheat, the past season, as the little we had remained unharmed, while whole fields of bald wheat were almost entirely destroyed by myriads of small birds resembling the rice-birds of the south, and which have never before visited us. It is unnecessary for me to say

more at this time concerning these birds, as I am apprized of your having noted down my remarks to the Hon. Mr. Kaufman on this subject. Our black prairie land generally produces from 30 to 40 bushels of wheat per acre, and is of a very superior quality, weighing about 70 lbs. to the bushel. Five bushels of our wheat are equal to 6 raised in Ohio, for it contains the nutritious quality called gluten in that proportion, as has been proved by actual experiments. From my experience in seeding, I prefer to sow from the first to the middle of October. Our wheat is ready for harvesting from the first to the middle of May, which gives us the advantage of having our flour in market one or two months earlier than that from any of the Western States. We generally sow about 1 bushel to the acre; but I prefer rather more. It is not common to plough our ground but once, and this at the time of sowing. I usually plant my ground with corn, preceding a wheat crop. I sometimes make a good crop of corn on the same land after taking off a crop of wheat, and then sow with wheat again the next fall. We are not troubled much with weevil, and not at all with the Hessian-fly. The average price of wheat is about $1 per bushel.

Corn.—The average product per acre is from 30 to 40 bushels. The cost of production is about 20 cents per bushel. I do not know that I can point out the best system of culture, for, having too much land to cultivate for my force, I am sometimes obliged to do many things different from what a scientific farmer would recommend. I suppose it is unnecessary for me to state the process of putting in a sod-crop. If any of your readers want any information on this subject, I would refer them to the letter of the Hon. H. L. Ellsworth, published in the Patent Office Reports for 1845. After this first crop, if not sown with wheat in the fall, I usually let the land remain without any further ploughing till I am ready to plant again in the spring, when I lay off my corn-rows only one way, and 3½ feet apart, with a plough. I drop my corn in the furrow, 1 grain in a place, about every 2 feet, and cover by turning a furrow from each side on the corn. When it comes up, I go through with a harrow, which levels the ridge and leaves the ground loose and in good order for giving the corn a good start. I usually give my corn one or two more ploughings after breaking out the middle, and then lay it by.

Oats.—The average yield on my land is about 40 bushels per acre. The quantity of seed per acre is 1½ bushels. Barley, rye, peas, and beans are also cultivated with good success. Peas are the best for renovating the soil, though as yet we have no need to cultivate them for that purpose. The cost of rearing neat cattle here is comparatively nothing, and the value of a heifer at that age, with her increase, is usually from $12 to $15. They usually commence breeding at two years old, and continue every year after until a very advanced age. We have no occasion to fatten beeves on any thing else than what our prairies and bottoms afford. Many of our citizens complain that the beeves are too fat, though the flavor is very fine. Some yearlings of the common breed have been killed in this neighborhood, which weighed about 400 pounds. Beef is worth $2 per hundred. Our high undulating prairies are peculiarly adapted to wool-growing, though no great attention has been paid to this business among our farmers; but from the experiments made, there is no doubt of its being a profitable branch of husbandry, for we have no trouble in feeding at any season. The raising of horses and mules is also profitable with us, and for the same reason. The large cotton and sugar plantations of Louisiana, as well as some portions

of our own State, always afford a ready market and good prices for all we can send them. If there is any one kind of stock that succeeds better than another, I would say that hogs have always exceeded any thing I have ever seen in any country, if we except the past year, for we have always before had an abundance of mast. This failure, together with the unprecedentedly long drought of the summer and fall, has proved very detrimental to our pork interests, for we have never before been obliged to feed our hogs on corn in order to make them fat, the mast (acorns) always being sufficient for that purpose. I think the meat thus fattened is better flavored than that fed upon corn, though the lard is not so hard: still, I believe it to be as good for all culinary purposes.

Cotton is one of the great staples of the Upper Trinity country, though, for the want of navigation on this part of the Trinity, it has not been cultivated so extensively as it would otherwise have been; yet we have tested this branch of agriculture sufficiently to prove that the quality of our cotton is equal to that of any other country, and, for the shipments we have made to Galveston and New Orleans, the highest prices have been paid which those markets afforded. I suppose a bale of 500 pounds would be a fair average produce to the acre. I have not heard any complaints of the rust or the bollworm. My system of culture is to throw up my land into beds, by ploughing four furrows (two on each side) together, leaving the middle unbroken. When ready to plant, I open a furrow with a small plough, and drill the seed sufficiently thick to secure a good stand, which I cover with a harrow, though a simple contrivance made of wood, which packs the earth close to the seed, I think, is better. As soon as the cotton is up, I thin it out to one plant for every two feet, the rows being four feet apart. The after-culture is very simple, the main object being to destroy the grass and keep it clean. Deep ploughing is not necessary. Should our land require renovating or improving, I should pursue a somewhat different course, which would be to bed up my land as early in the winter as possible, by first opening a deep furrow in the middle of the old rows, which is called the water furrow, into which I would put the stalks of one row, and whatever litter might be on the ground, and then bed immediately over it. This should be done early, in order that the ground may have time to settle close over the stalks beneath. A great many more hints might be given on this subject, but time will not permit. I have already extended my remarks on this topic to a greater length than I should otherwise have done, did I not believe the time had now arrived when the citizens of the Upper Trinity will engage with spirit in the cultivation of this great staple. The obstructions to the navigation of the river having been removed, there is now no difficulty in navigating it with steamboats. I do not know that the sugar-cane has yet been tried in our prairie country, though I am induced to believe it would succeed quite as well as it does in Harrison county, which is in about the same latitude as this, and where I have seen cane that had ripened well to the tenth or twelfth joint. The first year I moved here, I brought some sugar-cane with me, for the purpose of testing whether it would grow here. I planted it, and it came up and grew vigorously till the rabbits, which were then very numerous, began to eat it, and finally destroyed the whole. I have procured more, and shall try it again the next year.

Rice, as yet, is but little cultivated, though, from experiments which I have made, I am satisfied it might be a profitable crop.

Tobacco is also cultivated here by most of our farmers, on a small scale,

merely for domestic use; yet those who have raised it in Missouri and other Western States, say that it succeeds equally well here.

Root crops, such as beets, turnips, carrots, &c., are easily produced, but are not cultivated as a field crop.

Irish and *Sweet Potatoes* are also cultivated with good success.

Fruit culture is receiving increased attention among our farmers, many of them having now considerable orchards of peach and apple-trees; also many other kinds of fruit.

Not having kept a meteorological table since I came here, I cannot answer the questions propounded under this head, but think there is very little difference in the temperature here from that of Louisiana and Mississippi, in the same latitude. I think the aggregate fall of rain, during the year, to be about the same also. I have thus, sir, glanced over most of the items named in your circular, in a very hasty manner, and, should any thing I have said, have a tendency to benefit the agricultural interests, it will be a source of gratification to me to think that I have been of any service to your department, which I look upon as being one of the first importance.

I am, sir, with high esteem,

Your obedient servant,

S. G. PARSONS.

Philips, Franklin County, Maine, December 25th, 1850.

Sir:—Having received a circular from the Patent Office, soliciting information upon agricultural subjects, I would, in reply, make a few observations relative to some of the crops cultivated in this vicinity. Of all the products of the soil in this State, that of grass is the most important. From this source arise at least three-fourths of all the profits of the agriculturist. Maine exports, annually, vast numbers of neat cattle, horses, sheep, the products of the dairy, wool, &c.; consequently, it is all-important to produce the greatest possible amount of grass, both for hay and pasture. The pastures of this State will compare favorably with those of any other in the Union, especially for sheep, as they are generally elevated. The common method of seeding ground for hay is to sow the seed with grain, in the month of May. The grain is wet, and sometimes soaked in blue-vitriol water, 2 oz. of vitriol to the bushel, in order to prevent smut in wheat; the grass-seed is mixed with the grain in this wet state, to which it readily adheres, and thus it is sown evenly over the ground. The quantity sown is about 10 pounds of clover and 8 quarts of herd-grass (timothy) to the acre. These are the principal kinds of seed sown, though some add 1 or 2 qts. of red-top seed. The quantity of hay per acre varies from 1 to 3 tons. When it falls short of 1 ton per acre, the land is ploughed, and treated in the following manner:—We plough after the hay crop is taken off, or early in the spring, and sow with oats, which will yield a crop of from 30 to 40 bushels per acre; and immediately after this crop is harvested, the ground is manured and ploughed; and in the spring it is ploughed again, and planted with corn or potatoes, and sometimes sown with wheat, and seeded down to grass, but more frequently planted as above stated: the next spring it is ploughed, and sown with grain, and seeded to grass. The hay crop, for the past season, was rather above the average

and secured in good condition. Our wheat crop was of an excellent quality and a fair yield for late years. For the last ten or twelve years, the yield has materially diminished. The variety most in use in this vicinity is the red-bearded, which is much less subject to rust than any other variety that we have tried. An average yield per acre, is about 12 bushels. The time of seeding is in May, and of harvest in September. We generally sow 1½ bushels per acre. Good wheat is worth $1 per bushel.

The corn crop was very good the past season both as to quality and quantity. The yellow eight-rowed variety is most esteemed, the cob is small, and kernel larger than any other kind among us. Average product, 40 bushels per acre.

The last autumn was unusually mild: no frost to injure any thing till all the products of the farm were secured, except in some low situations.

Very respectfully,

Your obedient servant,

B. F. EASTMAN.

Waterloo, Granville, North Carolina.

Sir:—In reply to your circular, soliciting information on the different branches of agriculture, I will state such facts as have come to my own knowledge.

Our wheat crop, which, in this State, is generally small, was this year an unusually short one, having been attacked, a few days before harvest, with the rust, which cut it short in quantity at least one-third, and rendered it, in most cases, almost unfit for use. The state of the weather, at the time our wheat was attacked by the rust, has most sorely perplexed all the theorists who have attempted to account for the cause. The most generally received opinion of the cause of rust is, that it is induced by the superabundance of sap in the stalk, which, not being taken up and assimilated by the grain as fast as formed, exudes through the ruptured skin of the stalk, there drying and forming the rusty brown blotches or spots from which it takes its name. The weather heretofore considered most favorable to the formation of the rust is warm and damp, when vegetation generally flourishes best. The rust attacked our wheat this year, during an unusually cool and dry season, with cold dews at night. The wheat generally raised in this section is golden-chaff, a red wheat. The white varieties, of which there were some grown here, though the stalk was nearly as badly rusted as the red-head grain, were of far superior quality. Early sown, and the early varieties, seem generally to be less injured by the rust. Though the white bearded, (the only name by which it is known here,) a very late wheat, was the best in quantity and quality. Why the white varieties should escape the rust, I have not seen or heard satisfactorily accounted for. This crop has increased annually in this part of North Carolina, for the last ten years, with great benefit to the farmers, and manifest improvement to the farms. The average product per acre will not exceed 10 bushels, though, in some cases, I have known from 20 to 25 made on the acre. The time of seeding is from the 1st of October to the middle of November. Harvest, from the 15th of June to the 1st of July. The wheat is generally sown on land after tobacco, and turned in with the

single-horse-plough: when sown after cane, and the land is foul, harrowed in on a deep furrow.

The best preventive of Hessian-fly is to wait for a hard frost before seeding. This was the advice of the late Judge Buel. I have followed it for the last 20 years, and never had my wheat injured by Hessian-fly. Salt, sprinkled thinly over a bulk of wheat, prevents its being injured by weevil, or covering it with sassafras or alder bushes. The average price of wheat at our market, Petersburg, Va., is about $1 per bushel.

Corn.—The variety of corn preferred by myself is a mixture of the gourd-seed and rare-ripe. It is early and very sound, generally. Great advantage may be derived by selecting seed-corn from the largest and most prolific stalks. The average product per acre is from 10 to 20 bushels. The most important part of the cultivation of the corn crop is the preparation of the land before planting. It is my opinion that all land should be first furrowed deep, and then harrowed before planting with corn. The early cultivation should always be deep, and shallower as the crop increases in size. Our corn crop this year is quite small, owing to the long dry spell of weather, from May to November. It is now selling higher than for 10 years past, 80 cents per bushel. Peas are considered the best renovator now in use in this section of the State; are more generally used for this purpose, and for fattening hogs, than any other crop; but are seldom raised here for market. But little attention is here paid to the grasses, although they are coming more generally into cultivation. Our all-absorbing crop is tobacco, which takes precedence of all others. The average yield per acre is from 800 to 1000 lbs. It is generally considered the most profitable crop when the soil and climate suit; and particularly in places far from market. I believe the crop made in this State stands as high as that made in any part of the United States for manufacturing into chewing tobacco. The method of curing has undergone a great change within the last five years. It is now cured mostly by the sun and air. After it is housed, very small fires, made with seasoned oak, hickory, sweet gum, or sassafras with the bark taken off, are preferred to dry it in damp weather, when the tobacco is soft, or, as we say, in high order. The wood should be split in small pieces about two feet long, and not larger than a man's arm. The object is merely to dry the tobacco, not to smoke it. Our crop was cut short this year, three-fourths, by the long-continued drought, freshets, and frost. The quality this season is generally very inferior; the price in market higher than for several years past; so that it is believed that the income from the tobacco crop, this year, will be as great as usual.

Much more attention is now paid to wool-growing than formerly. The number of sheep in this neighbourhood has doubled during the last five years. Wool is now becoming an article of export; most of our winter clothing is manufactured at home; and in our dwellings you may see some carpets as nice as can be found anywhere. Where lands are so cheap as they are in most counties in this State, I think wool-growing might be made very profitable. Sheep here cost nothing but attention in summer, and not than 10 cents per head during the winter, as they never require feeding here except in unusually bad weather.

As to hogs and cattle, we only raise enough for home consumption. Fruit is now more attended to than formerly, and, instead of being gathered for distillation into brandy, is now grown for the purpose of feeding and fattening hogs. As to manures, we may truly be called Rip Van Winkles;

for I am sure no people could pay less attention to raising it than most of us do. For information on this subject we must be your debtors.

Yours, very respectfully,

F. R. GREGORY.

Burlington, Vermont, January, 1851.

Sir:—The culture of fruit has been for many years much neglected in Vermont, though apple-orchards were planted on almost every farm on its first settlement. At present the culture of fruit, particularly of apples, is exciting much attention. Old orchards are receiving more culture, and great numbers of young trees are yearly planted. Some portions of the State, particularly the valley of Lake Champlain, produce apples equal to any part of the United States, which are found to be one of the most profitable crops a farmer can raise for exportation. There has not been a failure of a fair amount of apples any season since I have been a resident of this valley, (twenty-five years.)

No other article grown pays *one-half* the profit to the farmer as good varieties of apples; and, even for feeding to his stock, an acre produces more value than any other crop, and with less labor. Of the comparative value of apples and potatoes for feeding stock, I cannot speak from accurate experiments. I have, for the last two years, fed apples, both raw and boiled, with and without meal, to hogs from the middle of August to December, and am satisfied they are equal to potatoes fed in like manner. I have also often conversed with farmers, who fed large quantities both to hogs and cattle, and find their general opinion to be that apples and potatoes are of about equal value for feeding.

Vermont, like other States, has many favorite seedling apples, both for autumn and winter. In the northern part of the State, the Fameuse for autumn, and the Pomo-Gris for winter, both from Canada, are much cultivated, and are great favorites. The Early Harvest, Bough, Red Astrachan, Porter, and Gravestein are among the best summer and autumn fruit; and the Greening and Roxbury Russet are among the best for winter use and exportation. The Esopus Spitzenberg is much cultivated; but neither this nor the Newtown Pippin, which is also common, is so well adapted to our climate as the Baldwin and Roxbury Russet.

Pears grow in most parts of our State in great perfection. One of our best is the old white Doyenne. (St. Michael's, of Boston; Virgalieu, of New York; and Butler pear, of Philadelphia.) This grows in great perfection, while it fails near the Atlantic coast.

Plums are abundant: in many parts of the State, found growing wild.

Peaches are but little cultivated, though not uncommon. As to disease, the blight on apple and pear trees, black knots and yellows on peaches, are so rarely seen, that no attention has been given to them.

The *grapes* mostly cultivated are native varieties of New England, which, including seedlings, are very numerous. The Isabella, Miller's Burgunda, white Sweetwater, and many others ripen, but require slight protection.

Spring planting in this cold climate has many decided advantages over fall planting, and should be adopted for all fruit-trees, vines, and shrubs.

As to planting and cultivating fruit-trees, the best advice that can be given is to study vegetable physiology, so as to have a slight knowledge of plants and trees, with the chemical properties of the different kinds; then manure accordingly, with thorough cultivation, and drainage when necessary.

But little wine is made in the State from grapes, though many families make small quantities. Wine is also made from currants. I have had from 50 to 100 gallons made yearly in my family, from red and white Dutch and black Naples currants, from the following receipt:

To make currant wine.—The fruit should be gathered when fully ripe. The juice may be expressed by washing the currants in the house, and straining through a common strainer. A man or a strong woman, accustomed to washing, will easily prepare the juice for a barrel of wine in a day. Have a clean cask, of the size you want to fill; let it stand on one end, and have a hole 2 inches in diameter in the other, to allow the scum to pass off. For every gallon your cask will hold, put in 1 quart and 1 gill of currant-juice, 3½ pounds of clean light-brown sugar; fill with water, and thoroughly mix. Shake the cask daily for 2 weeks while fermenting, filling the cask with diluted currant-juice as the scum passes off; then stop tight, and let it stand in the cellar until December, when it may be drawn off and bottled. It may be kept any length of time without the addition of alcohol; but 2 or 3 per cent. of pure brandy is added when bottled. It may be kept in the cask, though bottling is commonly thought best. For white currants, white loaf-sugar is used, making a clear white wine. We have also 50 gallons in a season from the berries of the common white elder, which resembles a rough port wine. This is made like the currant wine, except that 1 gill more of the juice of the berry is used for every gallon. This and the currant wine improve by age.

C. GOODRICH.

Hon. THOMAS EWBANK.

Rock Haven Point-Office Farm, January 15th, 1851.

Sir:—Some time since, I received a circular from the Patent Office, requesting information respecting my experience in agriculture. My farm is situated on the bank of the Ohio River, on the Indiana side, about 30 miles below Louisville; and consists of 300 acres of cleared land, all of which is under cultivation, and 140 acres woodland, which is in pasture, making 440 acres under fence. My staple crop for a number of years has been hay, of which I raise about 200 tons annually, which I bale for the New Orleans market. I raise from 1 and 1½ to 2 tons per acre. As yet I have used but little fertilizing matter, the soil being very productive without; but barn-yard manure or straw, ploughed in, has, so far as I have tried it, doubled the crop on a stiff soil. The pure timothy-seed, unmixed with any other grass, is preferred for hay intended for the market; but, for my own use, I prefer a mixture of clover and timothy. Two gallons of timothy-seed is the amount sown on an acre of ground, when sown separate; and, when a mixture of clover is wanted, I would sow with the two gallons of timothy one gallon of clover. I have succeeded best in the fall and winter sowing, the ground being prepared for wheat in the month of September. I prefer to sow my seed, giving it one harrowing; then, to sow the grass-seed, har-

rowing again, so that the grass-seed gets one harrowing. I prefer this process to that of leaving the seed on the surface, wholly dependent on the heavy rains to imbed it in the surface. If, however, I fail by this process to get a sufficient quantity of young timothy in the fall, I resow during the winter, on the snow; and, between the two, I have never, as yet, failed to get a sufficient stand of timothy-grass, for a swath of hay, the season following the crop of wheat. If, however, grass is wanted without the wheat, the grass-seed may be sown alone, on the ground prepared as for wheat, and can be mowed the following season; but, usually, the first crop will be lighter than when sown with wheat and suffered to stand a year longer before it is mowed. Spring sowing is hazardous, unless sown in February, and then not so safe as fall or winter sowing. As to the cost of raising hay, I consider that, when sown with wheat, the cost of setting an acre of grass will consist of the following items, viz.: Two gallons of seed at 50 cents per gallon, $1, and the sowing of the same, at a cost of 25 cents, make the sum of $1.25 per acre, without rolling, which should be done in the month of February or March preceding the mowing; for, if the roller were passed over the ground when the sowing was done, it would assist the vegetation of the grass-seed very much, by compressing the soil, thereby retaining the moisture. The cost of rolling, per acre, would be, for driver 75 cents per day, and team $1.25, making $2 per day. Eight acres would be a fair day's work, making the cost 25 cents per acre. Harvesting the hay is estimated at $2 per ton, and baling $1. Thus, one acre of grass, producing two tons of hay, would cost as follows:—

Seed	$1 00
Sowing	0 25
Rolling	0 25
Harvesting	4 00
Baling	2 00
	$7 50

The average price of baled hay, at the river, is $10 per ton, amounting to $20 per acre, deducting expenses, $7.50, leaves $12.50 as the net proceeds of an acre of grass. I consider my grass crop worth to me, on an average, $10 per acre. The best baling fixture in our county is called the Mormon press, consisting of a beater to beat in the hay as the screw is receding, and an iron screw; the cost of the same, aside from the building in which it operates, is $175, and the building will cost $100, making $275 outlay for baling fixtures. It will also require an outlay of $500 to build suitable housing for 200 tons of hay. My screw has been in use 6 years, and looks as if it might last 6 or 10 years, or, it may be, 15 years longer. I put up the bales, about 4 feet long and 2 feet square in thickness, weighing, on the average, 250 pounds. This kind of screw will make it much lighter; but the above-named way is tight enough to be saleable and convenient. My press puts up 40 bales per day, in long days, working three hands and a boy to drive. Three hands prepare the poles, bale the hay, and stack it in the house, from which the loose hay is taken.

I have also on my farm some 1500 bearing apple-trees; but, for the last 10 years, the fruit has been nearly unfit for market, on account of the bitter rot, but, during the last year or two, the disease seems to be subsiding. The crop this year has rotted considerably on the tree, as heretofore, but

the rotten part of the apple has not been bitter, as formerly. Before this disease attacked our fruit, I sold, in one season, from 500 trees, $1000 worth of fruit, besides what was used in the family. Since that period, my sales rarely exceed $100 per season, notwithstanding the enlarged size of my orchard. I have tried the application of lime to the surface of the ground about the roots of the trees, at the rate of 1 to 5 barrels per acre; but without any apparent success. I have also scrubbed the bark with a solution of potash, and inserted various drugs into the tree, by tapping and plugging; but without success. This has been a prevailing disease in all locations in this county; but it seems to be subsiding. I also had 100 pear-trees, bearing fruit, which, a few years since, died of fire-blight. I now have about a dozen, which seem free from disease, and have been bearing abundantly for three years. The fire-blight in pear-trees, after having prevailed here for the last 20 years, seems to have run out. My grain-raising has been without any system up to this time; but I now have a crop on hand, of which, another year, I expect to give a better account.

Yours respectfully,

JACOB L. KINTNER.

Henry County, Farmille, Virginia, January 24th.

Sir:—Your request would have been noticed sooner, but the Agricultural Circular was only received a few days ago. On only a few subjects will I submit a few remarks, leaving to others, of more leisure and superior knowledge, a full discussion of the important inquiries you make. In relation to ploughing, by far the most important work on the farm, I will observe, that every year's experience has convinced me more and more of the great advantage of ploughing *deep*, while I would by no means depreciate the utility of the various manures or other means of fertilizing the soil; yet, for this purpose alone, "deep ploughing" is invaluable. Not only by this means are larger quantities of the soil exposed to the fertilizing action of the atmosphere, rains, dews, or frost, but, by imbibing the rains that fall, the soil that is ploughed *deep* retains not only what it already possesses, but whatever it may gain through the decomposition of vegetables, &c. It will be admitted, that if a dam were thrown across a ravine, so as to catch and retain the soil that is washed off by the rains from a certain area above, in a few years' time, the accumulation would be sufficient to enrich the entire land from which it came; yet the land from which it was washed might remain as productive as before. In this case, the restorative processes of nature would repair the injury as fast as it was produced. Now, suppose any method could be adopted by which both the regular supplies of nature and the original soil could be retained, it is obvious that the land would be doubled in fertility. The hill-side ditches, however well graded, cannot answer this purpose; for whilst they may prevent the formation of gulleys, they still allow the rain-water, impregnated or charged with the lighter, richer, and more soluble particles of the soil, to pass off. The "solid," or unploughed space, left between the rows of the growing crop, to prevent the "crushing of the land," will not answer, for a similar reason. As far as I know, there can be no remedy for this evil but deep ploughing; ploughing to a depth sufficient to allow the imbibition of all the rain-water

that falls. This may appear impracticable to those who have not tried it; yet, it is well known to those who have, that if the soil be well broken to the depth of 15 or 20 inches, with a large turning plough, and subsoil plough, none, except the most hasty rains, if any at all, will run. Within the last winter, I have seen, on my own farm, this fact fully illustrated. A rain, unparalleled in this country, by which the water-courses were raised higher than they had been known for many years, fell on a piece of land that had been recently ploughed to the depth of 12 or 14 inches, yet not a drop escaped, and consequently no part of the soil was borne off. Another advantage of deep ploughing is, that when the surface has been exhausted to some extent by continued cultivation, many "earthy matters" that existed some 15 or 20 inches below are brought up and combined with the surface, so that a new soil is formed. One of the most productive fields I have, was made so by this means, after having been greatly exhausted. Another great advantage of deep ploughing is, that, to a great extent, it corrects the destructive effect of extremes in the seasons on the growing crop. Had we command of the clouds, so that we could stay their torrents when in excess, or provoke their genial showers in times of drought, there would be but little difficulty in making abundant crops, even on lands of common fertility. This power the great God of nature will never transfer to his ungrateful creatures; yet, he has permitted us, to a very great extent, to escape the effects of those apparent extremes, with which, for some wise purpose, he is ever visiting the earth. Through land that is deeply and well ploughed, water readily percolates. If it fall in excess, by means of a greater evaporation from a loose soil, but especially by its rapid percolation downwards, it soon disappears: a crop escapes all injury. If, on the other hand, there should be a deficiency of rain, the moisture from the subjacent clay more readily rises; the roots descend deeper to meet this moisture, and thus a crop, that might otherwise suffer from the want of rain, maintains its luxuriance and health throughout the driest seasons. One other advantage I will mention. By this means, a larger quantity of soil is rendered capable of producing, and consequently the crop may be grown much thicker than it otherwise could. We suppose a soil 6 inches in depth. A plough that runs 8 inches in depth, will certainly cultivate and prepare double as much soil in the aggregate as one that only cuts 4 inches, and thus, while the extent of surface may be the same, double as much soil is prepared and exposed to the action of roots of the growing crop in the one case as in the other, since the crop may be almost in the same ratio planted thicker. There is yet one other advantage, which I will mention. It is known that many soils abound in the roots of briers, sassafras, and other shrubs. These are more effectually exterminated by deep ploughing than by perhaps any other method. And, instead of their growing and taking from the crops much of the nutriment of the soil, they are killed, and, by their gradual decomposition, converted into valuable manure.

I will now add a very few remarks on the culture, &c. of the tobacco crop, confining myself only to those parts of the process that are less generally understood, and in which most planters are greatly deficient. It is well known that there is no part of this whole process more important than the raising of plants. The success of the crop depends, in a great measure, on the supply of early plants. The season here is short, and if, from any cause, the crop should be planted late, the plants are not only more difficult to live, but there is not, unless the seasons are more propitious

than usual, full time for the crop to mature. The tobacco crop here is usually large and important, and is perhaps surpassed by none in its quality for manufacturing purposes, and the best methods of raising plants are as well understood here as in any other part of the country. Last spring, notwithstanding the general failure, and the very unfavorable character of the season, and the great depredations of the fly, we had an abundance of early plants.

A suitable place having been selected, (of which every good planter is a judge,) it should be burnt thoroughly. The surface should be exposed to the action of a hot log-fire, for two and a half or three hours at least. Then the ashes should be removed, and the bed deeply hoed, dug without being turned, to the depth of 8 or 10 inches. It should then be well manured with fresh stable manure, clear of seeds of all kinds, (that made from wheat chaff is perhaps the best,) and afterwards sowed. The bed should then be covered well with brush. Should the seasons be dry, the covering should be very thick, and, on the other hand, should the seasons be wet and warm, less covering will answer. Should, however, the plant be endangered by frost or the fly—two common sources of injury, if not entire destruction—a thick covering of pine brush, together with a second covering of manure, will be found most effectual remedies. There being nothing peculiar or worthy of remark either in the planting or culture of the crop, I proceed at once to the best method of curing. On this subject there is a great diversity of opinion, yet I think the method I am now about to propose will always insure a superior article, especially for manufacturing purposes. The plant should be allowed to become thoroughly ripe before it is cut. Tobacco, unless it become thoroughly ripe, can never be made of good quality, whatever may be its color. When cut, it should be hung on the scaffold, with its tails very near the ground, surrounded or covered on its sides with brush, so as to exclude the air, until it acquires a yellow color. It then should be removed to the house, (taking care not to hang too thick,) and immediately exposed to the fire. If common wood should be used instead of coal, thoroughly dry, yet sound, wood should always be taken. Small fires of this wood or coal should be made over the floor of the house, sufficient to raise the temperature to 90° of Fahrenheit's thermometer, or that of the sun of a moderate summer's heat. This should be continued 4, 5, or 6 days, until the leaf is thoroughly dried, then the fires should be suddenly increased so as to cure the stems in 12 or 16 hours. This process will insure a beautiful yellow or nutmeg tobacco, without the least color of green, or that "green taste," which is so peculiarly offensive, and which, by no process in its subsequent management, can be remedied. Should the flue be used—a peculiar method of curing here—the same rules as it regards color and temperature, &c. should be observed.

Respectfully, ANDERSON WADE,
Henry County, Virginia.

North Anson, Somerset County, Maine, December 7th, 1850.

Sir:—Being situated as we are, in the valley of the Kennebec, near the operations of the *lumbermen*, our efforts in agriculture are, as a matter of profit, chiefly directed to supply the market afforded by that branch of business; therefore, in past years, experimental farming has been practised

only so much as would tend to furnish *bread* and *pork* for the men, and hay and provender for the oxen employed in obtaining lumber. Lately, however, since the failure of spring wheat and potatoes, the agriculturists have been making experimental trials, in order to remedy, as much as possible, the loss of those important crops. Purely scientific farming is not known in this region. A hard flinty slate-ledge, the strata running north-easterly and south-westerly, underlie this section of country. The intervals or meadows which lie quite extensively along the river and large brooks, are fertile alluvial deposits. The upland is diluvial, and in many places considerably covered with boulders, the larger of which are granite.

The following analysis, made by Dr. C. Jackson, state geologist, in 1838, of soil taken from a plain elevated some 60 feet above the river, shows a large proportion of carbonate of lime. As there is no lime-rock to be found in the vicinity, it must have been brought hither by a diluvial current, from *limebeds* lying some distance to the north of us. Indubitable evidences of there having been such a current running south, 10° or 15° east, are found in many places.

Analysis of 100 *grains of the fine soil was found to contain—*

Water	7.6
Vegetable matter	5.6
Peroxide of iron	6.1
Carbonate of lime	4.6
Insoluble	75.0
	98.9
Loss	1.1
	100.0

We have, however, all the varieties of soil to be found in a broken country, from the fertile intervale to the barren mountain-tops.

I will now reply to your schedule of questions, rather by approximation than otherwise, regretting that our practice and results cannot be more definitely stated. The crops of *spring* wheat, the only kind formerly cultivated here, have been greatly diminished by the ravages of the weevil, which commenced its destruction eleven years ago; since that time, the average quantity raised per acre is not over 10 bushels, and that of an inferior quality. We know of no *remedy* for the pests, except to sow no grain for them to destroy, though late sowing, as late as the 1st of June, will avoid the weevil; then there is great risk of its being cut off by rusting: the last evil, is, perhaps, the lesser one, and more grain may be raised by sowing late than early. The varieties most in use are the tea, and Black Sea, or red-chaff wheat: two bushels are sown upon an acre, on the older cultivated ground, and five pecks on the newly cleared, usually sown dry, but sometimes wet and rolled in lime or ashes, from April 10th to 10th of May. Price in market, $1.34. A railroad to Waterville, 27 miles from us, has a tendency to keep the price proportionate to that of imported flour. Since the weevils commenced their depredations, attention has been turned to the cultivation of winter wheat, and, for a few years past, the Kloss Blue-stem, or, as it is popularly called here, "Banner wheat," has succeeded remarkably well, producing generally 25 bushels per acre. This variety, as I understand, was first received in this State from the United States Patent

Office, and cultivated by Mr. Drew, editor of the Gospel Banner, Augusta. A great quantity of this variety has been sown this season, and, should it succeed as well as it promises, we will soon return the flour-barrels, which are so plenty around us, filled for the sustenance of those who are unable to raise their own wheat, as we have been. It should be sown the last of August, or first of September. We can raise *wheat straw* in abundance, and, were it not for the accidents to which the berry is liable, a proportionate amount of the grain also.

Corn is now considered to be one of our surest crops, not having failed for a number of years. The 8 and 12 rowed yellow corn are usually preferred; other kinds, as the Brown, Dutton, &c., are planted by some. The former varieties are the ones adapted to the climate, having been cultivated in this vicinity by the Norridgewock Indians, a long time previous to the settlement of the Europeans upon the river. To succeed here, it must ripen before the 20th of September, as we generally have frosts about that time. The average product is 40 bushels of shelled corn from an acre, (100 have been raised,) costing 56 cents per bushel for raising. The best method of cultivation for it, is to spread 12 ox-cart loads of well-rotted manure upon an acre after it is ploughed, and work it in with a cultivator or harrow, then put as much more into the hills; plant, covering it just enough to prevent the seed from becoming dry, and hoe it twice: then you may safely trust in Providence for a remunerating harvest. An acre of corn planted upon hog manure will yield twice as much as when put upon manure from the barn-yard. It should be ground and cooked in order to be fed most profitably. *Pumpkins*, such as *pumpkin-pies* are made of down East, are raised among the corn. Hogs are seldom fed exclusively on corn, other grains and roots being used for that purpose.

Oats are an exhausting crop. The only *safe* method for their cultivatior without manure, is to plough up grass-land and take off but one harvest. seeding down again to grass at the time the oats are sown, thus having one set of roots decaying whilst there is another forming on the top. Three bushels of seed are sown upon an acre, which will generally produce 30.

Peas yield 30 bushels per acre—never cultivated here as a renovating crop; but are often sown with oats, seeded half-and-half for feed for hogs and cattle. Spring and winter rye are sown with varied success, producing, one year with another, about 12 bushels per acre. Sometimes it yields exceedingly well, but is too much of a chance crop to be firmly relied on. Price, $1 per bushel.

Barley flourishes well, producing 30 bushels from an acre.

Buckwheat is cultivated quite generally, especially the rough variety, usually called Indian wheat here. Fritters made of it are thought to be "good enough for company." Besides, it makes good pork when fed to a "porker:" 40 bushels may be raised from an acre.

Beans are most frequently planted with the corn; but it is called better to plant them separately in drills. Land made as rich as for corn, will produce 30 or 40 bushels. They are sold here for $1 a bushel, and sometimes more.

Maine is decidedly a good State for grazing and hay, one of its most valuable products; and, without much difficulty, it may be raised in great quantities. One ton is near the average product per acre from all the lands producing grass; but two or more may be easily raised in cultivated fields. The land is not exhausted when it fails to produce English grass, but only

needs turning over and new seeding, with *eight* pounds of clover and a *peck* of herds-grass seed, taking off a crop of oats, in the time, to pay for the labor. Or, what may be called a better renovator and fertilizer for *pastures* and *meadows*, spread upon them, in the fall, a *compost* made of equal parts of swamp-muck and barn-yard manure. Hay costs $4.50 per ton, when in the barn, unless the season be a very good one: then it would cost less. A drought in June lessens the quantity of grass.

Land is considered as "put through" a regular rotation of crops when the sward is broken up, and sown in the spring for oats; the next spring manured and planted with corn or potatoes; and, the following spring, sown to wheat, and seed down to grass again.

Corn and potatoes are planted, and wheat sown successfully on sward land-ploughing. Corn is more apt to be injured by the *cutworm* when thus planted, than when upon stubble-land.

But few have paid particular attention to *dairy husbandry*. Almost every family makes butter and cheese enough for their own consumption, and often a surplus for market besides. The average price of butter is 14 cents, and of cheese, 8 cents. Those who have made it their business, however, find it profitable.

There has been, of late, considerable care and commendable rivalry in the anagement and rearing of neat cattle for market—the result has been a great improvement upon the old breed, and, consequently, an increase in their value. The *rule* for cost of rearing cattle is, $4 for keeping a calf from spring until fall, and $4 a year thereafter until 3 years old, making a cost, at that age, of $16, which is the price of an ordinary one here. Our surplus stock is readily bought up by drovers, and driven out of the State, chiefly to the Brighton market. Oxen command a good price, if they are fit for service in the woods, bringing $100 a yoke. Good dairy-cows valued at $15 in the fall, and $30 in the spring.

The advantages of wool-growing to the agriculturist are not fully appreciated by a majority of the tillers of the soil; because sheep are peculiarly adapted, by their habits, to render important services as pioneers to the plough, reducing, in a few seasons, lands that have been mortgaged to weeds and briers to arable fields, and, while doing it, thrive so that their sides will stick out with fatness; or will scale the rough hill-sides, and glean food where the implements of husbandry are useless. They invariably leave a pasture for having been kept in it: an old sheep-pasture that can be ploughed may be looked upon as but one step from a well-filled granary.

When the desideratum is to obtain mutton, the large coarse-woolled breed should be selected; but, if the raising of wool is made paramount, the Merino is superior to all others introduced among us. They will *grow* more wool from the same weight of sheep, will eat a greater variety of vegetables, are more peaceable,—therefore requiring less watching to keep them within enclosure; and, taking all the items of expense and care into consideration, will *produce wool as cheap* per pound as any of the coarser breeds. Any pedigree of fine-blooded sheep requires more tending through our five months winter than the coarser native, but the compensation for the extra care is more than made up by the less amount of food consumed, by the finer, in producing the same quantity of wool.

Our flocks, young and old together, average 3¼ pounds per head—instances of shearing 8 or 10 pounds from a sheep are not uncommon; the more Merino-blooded the sheep are, the more is the proportionate weight

increased. Among us, there is difficulty of obtaining a fair proportionate price for the different grades of wool. Our wool-merchants seldom make more than 8 or 10 cents difference between the finer and coarser staple; a difference which does not compare favorably with other sections of the United States: a *fact* which our wool-growers should take cognisance of, since we can and do raise the finer qualities, having obtained the stock from the best Merino flocks of Vermont, and other places where it was obtainable. A ton of hay will winter sheep enough for a clip of 17 pounds. The yearning time for our northern latitude is the last of April and the first of May, about the time vegetation commences. The lambs raised are, in proportion, two-thirds the number of ewes. After an experience of 30 years with a flock of fine bloods, and observation, during the time, upon the efforts of others in wool-growing, I am fully convinced of there being more profit in raising fine wool-producing sheep. Capital invested in them is available twice a year; in the fall, lambs and mutton are readily turned to cash, and, when spring comes, they tender their fleeces for all arrearages.

It is truly said that "a sheep may die indebted to its *purchaser*, but *never* to *him* who raised it."

As for the *breed of hogs*, we have had a great many different kinds, and they have been mixed and crossed until their *given names* "are used up," and no other left but *hog*, after all. They are important assistants in making a good cornfield. Three hogs, properly supplied with chip-manure, swamp-muck, or horse-stable manure, will make dressing enough to raise 80 bushels of shelled corn from an acre of land. The *cheapest* method of obtaining pork is to feed well from the pig upwards. Weight, when dressed, from *three* to *five* hundred. *Price*, average for round hog, 6 cents per lb.

Roots.—Since the rotting of potatoes, the root crops have been advantageously cultivated, *turnips* and *carrots* being chiefly sown. One farmer in this vicinity has raised, the present year, *carrots* at the rate of 1000 bushels upon an acre, by spreading a quantity of manure upon grass land, ploughing it, and sowing the seed in the seam between the sods.

Irish Potatoes.—Here, again, we can use "the language of complaint;" for we once thought that potatoes would never fail us; but the rot came and taught us the uncertainty of raising potatoes "in particular." It pays but little respect to kind. Some years, one variety will succeed better than others; but in the result, they are about equally affected. Early planting on dry soil does best, by spreading the manure on the top of the ploughed land, harrowing it in, and planting the seed in hills on the surface. The yield is now about 50 bushels per acre where it used to be 200. All the tubers that grow late in the season are liable to rot, and the vines die early.

Attention has lately been given to fruit culture. Many young orchards of choice fruits have been recently set, and older ones improved by grafting.

Apples are considered to be a profitable crop, and are an important item in the luxuries of a living. It is thought that hogs thrive as much by being fed upon an equal weight of *sweet* apples as upon potatoes.

Manures of a vegetable origin are chiefly used; but *plaster* and *lime* are considerably used. They produce beneficial results when applied to light sandy or gravelly soils, but are inert when used upon clayey lands.

Strawberries, raspberries, blackberries, and blueberries are indigenous here, and, in some seasons, may be gathered in great abundance. Should it be desirable, they could very easily be cultivated in gardens or yards.

We are located pretty well north, besides being "a long way down

east." The parallel of 44° 47′ 40″ crosses the village in this town. For this latitude we have the long range upon the thermometer of 110° F. Some of our hottest days raise the mercury to 102° F.

With due respect,

Your obedient servant,

WILLIAM R. FLINT.

Hon. THOMAS EWBANK, *Commisssoner*..

Chester District, South Carolina, 1850.

Answers to questions sent me by the Hon. Thomas Ewbank, Commissioner of Patents:—

Wheat.—The varieties in use in this locality are, yellow Lammas, blue straw, Virginia white May wheat, and a few others with local names. The average product is about 7 bushels per acre. My neighbors talk of a higher figure, but I give you my experience and belief as to what we make now; and no wonder it is not more, as you will readily perceive when I come to state our system of cultivating it. The first two varieties require being sown early, say in September, or they will be likely to ripen late and be struck with rust in the spring, whilst the white May wheat is not usually sown before some time in November; for, although not always free from rust, yet, if sown too early, it is still more liable to injury from late frosts in the spring, from prematurely shooting out the ear. We harvest the early white May wheat, which alone is what I sow, from the end of May to the middle of June; the others, from the middle of June to the beginning of July. We prepare our seed by soaking it in a solution of bluestone (sulphate of copper) for 12 hours, as a preventive of smut, and, if well done, it is very effectual. We make the solution at the rate of 3 oz. of bluestone to the bushel in the first water used. The water left when the wheat is taken out to be sown is preserved and the wheat thrown into the same vessel, with 2 oz. more of bluestone to the bushel, and additional water put in, so as to cover the wheat, and which is well stirred in it. The wheat, previous to being sown, is rubbed in as much good ashes as will adhere to it, and is then sown broadcast, at the rate of 1 bushel to the acre. We do not usually plough for wheat, but our system is to scratch it in hurriedly with a grab or gopher plough after corn, without manure, not as a crop, but to get what we can; and well may we be thankful when we get any in return: 'tis truly a godsend. Our rotation, when regularly conducted, is cotton, corn, wheat, and rest, perhaps, for 2 years, though that rest is too often converted into pasture, eaten bare, and the yield per acre certainly averages less than what it used to do. We are not often troubled with the Hessian-fly, and know of no remedy; neither are we much annoyed with the brown flour-weevil, but are very much incommoded and seriously injured by the little miller-fly weevil, which deposits its egg in the seed whilst in the field, is hatched out in July and August, and, eating its way through, leaves the grain a mere shell. Our only remedy is to thresh early, grind early, and sun for 2 or 3 days what we reserve for seed and spring family use. Our hot sun destroys the embryo in the berry. Our usual average price is $1 per bushel. This year (1850) it sells for $1.50. Our crops were eaten up by rust. I must be allowed to say one thing, though, in favour of us poor Southern farmers, on the subject of growing wheat. Our lot is cast in a cotton region, and no

man can be a successful wheat cultivator and cotton planter at the same time: they interfere materially with each other, from beginning to end. Wheat is not cultivated for a crop, but a little is put in for family use; and cotton, cotton, cotton won't give us time to do that little well.

Corn.—Our seed is so generally mixed, that it is hard to give it any known name; the old gourd-seed kind is gone very much out of use, and that which I commonly use now is a Tuscarora—a mixture between the old gourd-seed and the low country flint-corn. I have now, for upwards of 30 years, been selecting every year my seed-corn in the field, from stalks not bearing less than two ears to the stalk; and it is now more difficult to find in my field a stalk with less than two good ears on it, than it was at first to find them with two ears—the average product about 25 bushels. We break up our lands as early as cotton will allow us; of course, it ought to be deep; but I believe I am the only man in this neighbourhood who uses the subsoil plough, and I have been doing so now for many years, with great benefit. Others say cotton will not give them time. Last year, when my neighbor, one of our best farmers, too, made 20 bushels of corn to the acre, I made 70, chiefly from the use of the subsoil plough. I lay off my land in furrows, at 4 feet apart, with a large, long shovel-plough, deep as I can get it done, and in the same furrow run my subsoil-plough with two horses, from 8 to 10 inches deep; in this furrow, where I have manure enough, I strew my manure, and then back up upon it with a two-horse Ruggles plough, running a furrow from 5 to 7 inches deep, and this is again followed by the subsoil plough in the same furrow: the whole bout is finished in the same manner. I then check off at 4 × by 2½ or ⅔, and leave but one stalk in a check. In these checks is usually deposited my manure, and, where that is cotton seed, it is always deposited in the check before planting. I keep my land level, use coulters and cultivators, and lay by with the cotton-sweep, leaving a good water-furrow in the middle: my land is a stiff clay, and my greatest enemy is drought. I never cook any of my grain, except for my milch-cows, and sows and pigs, and find it to be highly beneficial to them; but the most of my corn used is crushed on the cob, in one of Hussey's corn and cob crushers, a good machine, but the plates, which are the crushers or grinders, are not very durable, and are difficult to be got, far as I am in the interior. It now makes slow work; I have used up one or two sets of plates, and would freely pay the price of new ones, could I readily obtain them.

Oats, &c.—Average yield of oats per acre is about 20 bushels; barley, 15 to 20; rye, 6 to 10. Peas, by themselves, in beds 3 feet apart, and in chops on the beds, 18 inches apart, about 10 bushels; where among corn, 4 to 5: this I know will be considered a very low estimate by many; but, perhaps they never measured the peas after they were thrashed on the land. Beans are not cultivated here. Peas are decidedly the least exhausting to the land—indeed, rather benefit it. I have never known them cultivated here as a renovating crop to be ploughed in. Cotton hardly gives us time to gather our seed.

Clover and Grasses.—We have a little rough meadow, in strips, along our spring branches, which give 1 or 2 tons of a coarse meadow-grass hay per acre. I have but little of that, and no bottom land, and have never been able to succeed with any of the cultivated grasses upon our uplands, though I have been trying them for upwards of 30 years. I have had as fine clover in the spring as I ever saw anywhere, but it could not stand our

July droughts and hot September suns: it may probably succeed better on our rich, deep, mellow bottom lands.

Dairy Husbandry.—We have nothing under this head, having no meadows or grasses; and cotton having cut up our ranges, we scarcely make more than butter enough for family use; and home-made cream-cheeses are only to be remembered, and talked about by the old grandmothers of the district, as the occurrences of the good, abundant, happy old times, before cotton came in to be a crop.

Neat Cattle.—We really raise them with so little care, that it would be a shame to charge any thing for their keep up to 3 years old, when they will sell for about $5; a cow and calf in the spring, are worth $10 or $12; in the fall, from $15 to $25; to the rest I can give no answers; we have no improved stock here; no grass to raise and fatten them on; no market here to encourage one to exertions for improving stock, and come too high to feed for a distant market; when the railroad comes, it will perhaps be better.

Sheep and Wool.—Sheep might certainly be raised with profit, both for mutton and wool, but again we have no market for either. My neighbors generally will not eat mutton, and as there are as yet but few manufactories that use wool, scarcely more is produced than what is required for domestic use. I have made all of my negro winter clothes and blankets for 30 years. I long kept a little flock of grade Merinos for mutton and wool for family use, and have raised full-blood quite as fine as my original Escurial stock; but found the full-blood too fine for our farmers' use; they cannot card it. I now keep from 80 to 100. I raise my sheep at little expense, but have never made any estimate of the cost. I have shelter for them in winter, and give them hay in sheep-rack, or rather open frames, and sometimes a little oats, and have usually a green pasture of rye or barley for the ewes and lambs to run on: the price we get for our wool is just the same, whether fine or coarse—about 25 cents per pound. I do not doubt that the time is at hand when wool will be more, much more attended to—more discrimination be made in the quality and price; a market for it is rising up in the manufactories, that are rapidly growing in the Southern States; and it will, ere long, become an important and profitable branch of Southern husbandry. For 20 years, I raised as fine wool as Spanish stock, or any samples I could obtain from the North; it was highly approved by the Messrs. Dupont, of Delaware, and sold in Philadelphia at 50 and 60 cents; and the railroads will soon open to us a way of reasonable transportation.

Hogs.—The breed we find to suit us best is a cross between the black Siamese or China, and the Berkshire; they thrive upon less feed: but I should say that the Suffolk, Sussex, and other late imported English breeds are unknown here. We raise our hogs by allowing them to range in our woods, where they get fat in the autumn on acorns, and call them up at nights, giving them a little corn to keep them tame, and to help them on when the acorns are consumed. In November, they are usually put in pens to fatten, where they have water and as much corn thrown to them on the ear as they will eat. I also see that they are well supplied with charcoal, rotten wood, and ashes, all of which they consume with great avidity and benefit—no doubt as absorbants and correctors of acidity. I have never known of any experiment made of the quantity of meat made by a given amount of corn. I cure my flitches in the usual way of dry salting; my hams I rub the first day with salt, to draw off the blood; the next day, they

are packed loosely in casks, and cover them with Pocock's pickle, viz. 6 lbs. salt, 2 oz. saltpetre, 1 to 2 lbs. brown sugar or molasses, and 4 gallons of water, boiled together and well skimmed, in sufficient quantity to cover the hams well, pour it on them cold, and let them remain in it from 3 to 6 weeks, according to their size, and then hang them up and smoke them for a fortnight; and I will warrant, if you have one that has been well kept till this time, it will fill your dish with essence. As soon as you are done smoking, and which ought to be by the middle of February, bag them in a loose bag, but which has been previously soaked in a strong size made with wheat bran and water, and hang them up in a dry place with the string tied tight around, with the hock side down, and then keep free from bug or skipper, and remain juicy to the end. My smoke-house is 16 feet high, divided into two stories; the bottom one has an earthen floor, on which the fire is made; the second story, in which the meat is hung, is divided from the bottom one by a plank floor, which protects the meat from being heated by the fire, while the smoke is allowed to pass freely up to the meat through a double range of six-inch holes in the floor the whole length of the house, and which I think conduces very much to preserve the hams from becoming rusty.

Cotton.—The average yield here is from 150 to 200 lbs. of clean cotton per acre. I am no cotton-planter, and plant it only as a matter of necessity, to make a little money: it is with me a scourging, starvation crop, to land and every thing else. I leave you, for information about its culture, to those who like better, have better lands, and cultivate it better than I can. Drs. Cloud and Phillips will, no doubt, ably supply my deficiency.

Sugar-cane, rice, tobacco, hemp, are not cultivated here.

Root crops are not cultivated here as field crops. Turnips are merely sowed for domestic use on cow-penned patches, and are a very uncertain crop; our droughts in the end of August and throughout September burn them, even when they do come up. I have to depend on my spring sowing, even in my garden, for my supply of beets, carrots, parsnips, and salsify, and they are therefore frequently woody. Mine is a stiff clay soil, and I have to haul into my garden a good deal of sand to procure a due supply of them; but even in the most favorable soil here, they are never cultivated as field crops.

Potatoes, Irish.—Irish potatoes are only cultivated in our gardens and in patches, and, under good management, yield well, good, large, mealy potatoes; but I have not known any estimate made of what they would yield to the acre; we have no market to induce us to raise more than enough for our own immediate family use; for those raised from our spring planting in February, and which we usually begin to use out of the beds in May, and dig in in June, won't keep. By the end of July or middle of August, they shrivel up, sprout, and rot. Almost every year I make a second planting of them about the middle or end of July. If the season is favorable, I make good potatoes, which keep well all through the winter; but they most frequently fail to grow from the drought: those which I planted this year, never came up until in October, and but few of them then.

Sweet Potatoes.—The sweet potatoes do better, much better on sandy soil, and though not to be compared in quantity and quality with the low-country sweet potatoes, yet yield a fair crop: I have heard of 200 bushels to the acre being made; but they are never planted up here in any quantity, whereas, in the low country, where the climate suits them much better, they are cultivated extensively, being depended upon largely for provisions for

the negroes, and for fattening hogs; and I have even used them, when in great abundance, and with great benefit, in feeding my working mules, horses, and oxen:—big crop of potatoes, and every thing fat. Up here, we have to depend upon the root potatoes grown by planting the small potatoes, and which are called the seed; the product of these, called root potatoes, are much more difficult to keep through the winter, than such as are produced in the low country, as their principal crop, from what they term slips, which are cuttings, not of the potato itself, but of the vines. In the low country, they plant only a few acres of roots to raise vines for their principal crop; these vines are cut off throughout June and July, and stretched out in handfuls, lengthwise, on the tops of large beds prepared for them, and partially covered by hoefuls of earth thrown at intervals upon them; if rain follows, they take root, shoot them down into the beds, and produce there abundant crops of fine potatoes, superior in sugariness, and keep through the winter much better. I have known 600 bushels made to the acre; but I have travelled out of my province, or at least out of my district. You will probably ask why we do not do here as they do in the low country: the answer is simply, the climate will not allow it; the season up here in June and July, the time for setting out *slips*, is usually too dry to allow them to strike roots, which they won't do without rain, and allow them to grow in time to produce tubers of any size larger than merely for seed for another year, and oftentimes not even that, that few persons risk their labor even for that. The ground ought to be broken up well, deep, and early, and plentifully manured with straw, pine trash, or leaves, or any other vegetable matter, but ought not to receive stable or other stimulating manure, which will cause them to run too much into vine, and only produce fibrous roots instead of tubers. Cotton seed is a good manure, when it can be spared in sufficient quantities from the more important crop of corn. The best mode to preserve them for use is, after gathering them carefully in dry weather, soon after the vines are killed by frost, and their growth is consequently stopped—to pick out all decayed, cut, and bruised roots, pile them up in conical heaps, where they will be free from frost, and let them remain so to sweat for a few days—then pour over them well-dried sand till it covers them two or three inches deep. Preserved in this way in the basement story of my house, I have kept them sound and good, and unsprouted, until fresh potatoes came in again.

Fruit Culture.—The culture of fruit is certainly receiving much more attention than formerly. When I first came to spend only my summers up here, there were no orchards except of peaches for the still, nearly 40 years ago—there were but few apple-trees, and pears were quite a rarity—now every farmer has a small apple and peach orchard, though pears are still rare. One good thing cotton has done for the country, to make some amends for the destruction of our lands, has been to drive the stills out of the country; it does not leave the people time enough hardly to raise a sufficiency of corn for their own consumption, and without raising their meat, and, therefore, none for the still, and no time to carry peaches to the still, even in good and abundant seasons. I could write much upon this subject, but know you will have much of this kind of trash to wade through, and endeavor to condense as much as possible, and to answer your queries intelligibly. I have imported fruit trees from the North, largely and at different times, and grafted, too, wherever I could procure scions of good repute; the peaches and plums have done well, but pears badly; and apples from the

North have not succeeded with me at all. Both of these trees are short-lived with us when so obtained, and none of the apples from Prince's nursery, Newtown pippins, Rhode Island cooper, russet, &c., have ever perfected their fruit, though grafted and regrafted. I am still trying, however, some of the more modern kinds. Yet I have a few good summer and autumn apples, got from North Carolina, under various local names, but no really good winter-keeping apple. The farmers are just becoming aware of the importance of apples to their stock, but their orchards are quite too small yet, to draw any comparison between the use of apples and corn for stock; none are raised for exportation—freight has been too high; but I do hope that the completion of the South Carolina and Charlotte Railroad will bring with it a reduction of freight, and all the benefits attending such improvements, and so enable us to obtain a market for the various little articles we could raise, and an additional incitement to improve our orchards. I have paid a good deal of attention to the pear-tree, and have now 35 different kinds on my list, that I have either imported or grafted, but they are now a short-lived tree. I say now, because there are some very old, old-times pear-trees in this settlement. The imported tree will grow and bear well for a few years, and then die, most commonly with the real fireblight; suddenly—the whole tree blasted at once—some in full bearing, and some before they had ever fruited; and within a few years past, that disease, which commences with the dying of the limbs at their extremities, has done me great injury. I have lost upwards of 50 trees, of all ages, from a foot in diameter to a two-year old graft, and have had many others seriously injured by it; have tried all prescribed remedies and preventives in vain, without even benefiting by a change of location. Others have suffered nearly as badly, probably quite as much so, proportionably. I have not as yet had sufficient experience with the later varieties to test their durabilities, but the age of the variety does not seem to have much effect, for the old St. Germain does as well with us as any, while the Jargonelle (English) suffers severely. Our peach-trees are not liable to the yellows, but are dreadfully injured by the worm in the root, the best remedy for which, that I have experienced, is spent tanner's bark, piled up around the tree at the root; best when done in June and July, say a peck to a tree.

I have cultivated the grape for nearly 40 years, with very variable success. My soil is most unfavorable, and the drought and sun bake my stiff clay so hard that the leaves drop, and the berries wither up before the time for their maturity, though I cover their roots with leaves, and train them conically, that each vine might shade its own roots. I prune severely, and find the best manure is surface-mould from the wood, and ashes. Barn-yard manure makes them run too much to wood. I cultivate with the plough and prong-hoe, and, in good seasons, make tolerably good crops, but not to compare with Mr. Longworth, Weller, &c. The foreign grapes do not succeed with me any better than elsewhere. I have several varieties, but the Lenoir, Herbemot, and Bland Madeira do best with me, and it is chiefly from the last I have been making my wine for 30 years, and a very good wine it is. The birds and negroes are so destructive to my grapes, that it is difficult to keep those the drought spares me until they come near to maturity. I am obliged to gather them early in September, whilst those which hang around my piazza, and are preserved to the middle of October, are quite another thing. My juice strikes from 7° to 11° of Beaume's saccharometer; at 9°, one pound of good dry St. Croix sugar added, per gallon, gives me a pleasant,

dry wine, within 2° as strong as Madeira, and which has kept and improved to 10 years old, and would have kept much longer, had there been enough of it.

Manures.—I have but little to say on making and preserving manures; it is a subject but little attended to but by a few, and it is much wasted, our mild climate not obliging us to house our cattle. We have no cellars to throw our manures into, and but few have even sheds around their cattle-yards. The breadth of land we cultivate, and the few cattle we are able proportionably to keep, seems to paralyze efforts. My yard is scooped out in the centre about 2 feet lower than the external borders, have cattle-sheds 12 and 16 feet wide, furnished with mangers to feed in, and the whole is well littered with cornstalks, straw, leaves, weeds, and whatever roughage I can procure; and this way, and from my stables and mule-pens, I make about 200 wagon-loads of manure a year, and which, with the help of my cotton-seed, enables me to help a portion of my farm every year. It is quite too little for the need of my farm, and far less than I see others write of making, but it is more than any one makes about here, even with a larger stock and larger force. Lime, plaster, and guano have been but sparingly tried: the enormous price we have as yet to pay for carriage, renders them quite too expensive. I cannot get lime delivered to me under 65 and 75 cents per bushel; and plaster, which could be had in Charleston at $5 the ton, would cost $20 more to bring it up here: we could buy three acres of fresh land for what it would cost to lime one.

Meteorology.—The thermometer ranges highest in July. The hottest day this year was the 20th of July, with the thermometer at 78°, 88°, and 82°, at 8 o'clock A. M., 3 P. M., and 10 at night. I have known the thermometer to rise as high as 92° here, though very seldom. The thermometer ranges lowest in January and February; the coldest day this year was the 5th of February, when the thermometer stood at 18° at 8 A. M., at 34° at 3 P. M., and at 28° at 10 P. M. On the 8th of January, 1847, it fell as low as 8° in the morning, and I once, since I have been living up here, have known it down to 4°! No register has been kept of the mean temperature, or of the quantity of rain that falls.

I shall be very glad to receive a copy of your Reports, and have the back volumes up to 1848. They contain a mass of valuable and instructive matter; and I shall be happy if I shall in any way assist you in accumulating materials for your heavy labors.

Respectfully

WILMOT S. GIBBS,

Chestnut Grove P. O., Chester District, South Carolina.

December 16th, 1850.

WINE-MAKING NEAR CINCINNATI, WITH PLANS OF A WINE-HOUSE AND MACHINERY.

[From the Western Horticultural Review.]

Our frontispiece for this month is a view of the wine-house of Messrs. Corneau & Son, located on their place, at Latonia, in Kentucky, about four miles from this city; it is probably one of the most complete establishments of the kind in the country. The great and increasing interest that is felt, not only here, but in all parts of the United States, in reference to the culture of the grape and the manufacture of wine, induces us to devote some space to this subject, particularly as the vintage season is about over, and our vignerons are now able to determine the result of their labors and skill. Improvements upon the methods and practice pursued during the earlier periods of the manufacture of wine from the Catawba grape, are being made every year, and the result is, that a very superior wine is now obtained from this grape, and one that bids fair to rival the most celebrated brands of the old country. The wines manufactured by the Messrs. Corneau, as well as by Messrs. Yeatman, Longworth, Buchanan, and others, will not suffer in comparison with those which are imported in large quantities from the Rhine countries; but, on the contrary, are frequently preferred by those who have been most accustomed to the use of the Rhenish wines. Its perfect purity and mild tonic properties render it an important addition to our materia medica; and its use as a gentle and nourishing stimulant is prescribed by some of the most distinguished of our medical faculty.

One important improvement which has been successfully introduced by the Messrs. Corneau, is the stemming of the grape, by a very simple and rapid process, and which also increases the peculiar aroma, or bouquet of the wine.

Many attempts have been made to accomplish this result heretofore, but they have either failed entirely, or have been found impracticable for large crops. The method of the Messrs. Corneau is remarkable for its rapidity; two men being able to stem, mash, and place in the press, near 80 bushels of grapes in about 3 hours. We understand that they intend introducing some further improvements during the next season, which will facilitate their operations to a greater extent than those which they now possess.

A sketch of the details of wine-making, as pursued at this establishment, may not be uninteresting to our readers, and which will be readily understood by a reference to the accompanying cuts of the plan and arrangement of the wine-house.

A. Door, opening to the vineyard, by which the grapes are brought into the wine-house.

B. Back-door of wine-house.

C. Front-door of wine-house.

D. Opening through which the stones are thrown from the machine.

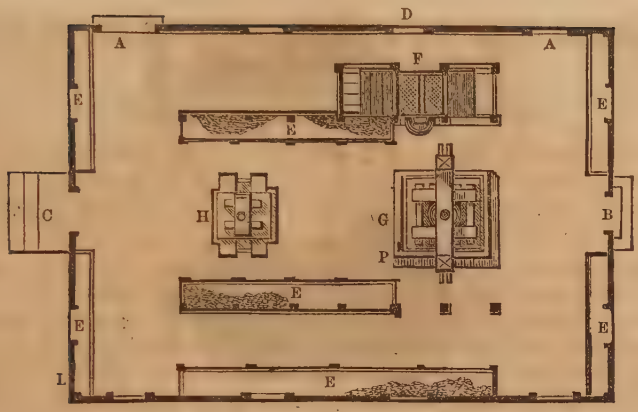
E. Tables for picking over and assorting the fruit previous to being stemmed.

F. Stemming and crushing apparatus.

G. Large press—capacity of 100 bushels.

H. Small press—capacity of 40 bushels.

L. Door opening into the basement.



Plan of a Wine-house.

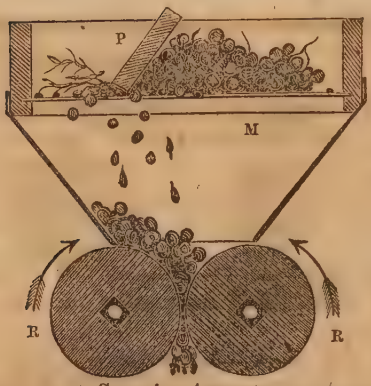
The following are the various operations of the manufacturing process, from the gathering of the grape to the bottling of the wine:

1. *Gathering.*—The grapes, when fully ripe, are gathered in baskets containing about a bushel, as well as in a sort of "pannier" of wood, made very light and strong, and which is supported by straps or thongs of willow, on the back of the picker, as represented in the frontispiece; they are brought from the vineyard in this manner and thrown upon the picking tables, where they are carefully assorted.

2. *Picking.*—This consists in removing by hand all green, shrivelled, or decayed grapes, which are thrown into tubs or barrels and pressed separately, to make a common wine or vinegar. The finest grapes are carried thence to the stemming apparatus, where they undergo another operation.

3. *Stemming.*—Beside the improvement in the quality of the wine which this process imparts, there is another material advantage derived from it, which consists in the diminution of the bulk or volume of any given quantity of grapes in bunches—the large press of the Messrs. Corneau being capable of containing upwards of 100 bushels after the stems are removed; from which about four hundred gallons of wine may be obtained. "Stemming" consists in separating the berries from the stem; it is done in F, (of the ground-plan,) by means of the apparatus, of which a wood-cut is appended.

The grapes are thrown on the wire sieve, M, which is open enough to allow the berries to pass, but retains the stems; a little plank, P, is held in an inclined position, to which a backward and forward movement is given by the operator, as shown in the next cut, so as to force the berries through the sieve, and to remove out of the way all the stems as they are stript: with the aid of this apparatus, two men can, in the course of 3 hours, if regularly supplied with grapes, stem from 70 to 80 bushels. Improvements might be made, by which the manual labor would be diminished; but this simple and cheap apparatus, which Mr. Corneau has introduced, is generally used by the wine-manufacturers of France.



Stemming Apparatus.

4. *Mashing.*—After passing through the stemming process, the grapes fall into a wooden mill, consisting of two rollers ridged obliquely, to one of which is attached a set of screws, by which the distance from each other may be graduated to the proper degree; it being desirable that every grape should be crushed, but that the seed should not be broken.

The rollers are turned by hand: the above wood-cut exhibits, in R R, a section of these rollers, and that which follows shows two men, one stemming, the other mashing the grapes.

Stemming and Mashing.

From the rollers, the grape (being entirely separated from the stem and thoroughly mashed) passes into the press, where the final operation of separating the juice is performed. The wine passes from the bed of the press, by means of a conductor, into the basement, from whence it is conveyed into casks containing 260 gallons each; these, though by no means of so large a size as those used by some of our wine-manufacturers, are of a very

convenient capacity for ordinary crops. The first fermentation takes place immediately, and, at the end of 6 or 8 weeks, the wine becomes clear—or, what is technically termed "fine;" a second fermentation takes place in the spring, about the period of the blooming of the grape. The wine should not be bottled until it is at least one year old, though it is frequently bottled for immediate use, just previous to the second fermentation: this may be done with safety if the bottles can be kept in a very cool place. There are many who think the Catawba wine is better at this period than ever afterwards.

Mr. R. Buchanan, of Clifton, whose beautiful vineyard has been so universally admired by all visitors, and whose wine is so excellent, has also introduced an apparatus for separating the stems from the mashed grapes, which is remarkable for its simplicity, being a large sieve, with meshes of about three-fourths of an inch aperture. The grapes are passed through this after being mashed, and thus separated from the stems.

Mr. Yeatman also uses the sieve to separate the stems from the mashed grapes, before he puts the pulp in the press.

WINE-MAKING IN CLERMONT COUNTY.

Mr. George Weir, of this neighborhood, has made, this season, 4800 gallons Catawba wine, from 8 acres of land—over 600 gallons to the acre. Judges say it is a superb article.

Thomas Williamson, we are told, has made over 1300 gallons; the precise amount we have not learned.

William Carnes made nearly 70 gallons on 2½ acres, first year's bearing.

Charles Burkheart made 150 gallons, on a little over an acre of ground, first year's bearing.

Michael Male made 240 gallons on 2 acres, first year.

Benjamin Light, about 1700 gallons on 3 acres.

Peter Light, about 1400 gallons on 3 acres.

This makes in all, 12,960 gallons, including Mr. John Williamson's. This, at the lowest price offered, will make $6480.—*New Richmond (O.) Age.*

Quincy, December 4th, 1850.

Sir:—Enclosed I hand you answers to some of the questions contained in the Agricultural Circular, dated August 26th, 1850.

The replies given are confined to such matters as come frequently under my observation; and I have been careful to reject any thing in reference to the subjects about which the opinion of practical farmers was not obtained. The profession of agriculture is, in this region, sensibly and steadily approximating towards its proper consequence and dignity, though, as yet, there is a great number of its members deficient in intelligence and enterprise. Our section of country is new—the average settlement of our farms will not

reach 12 years: no part of the Union has a population more diversified, either in homebred or imported stock of the genus homo. It will be, therefore, unreasonable to expect much of us until we have attained more homogeneity in habits, peculiarities, and even in tongue. There are, however, indisputable evidences of awakened spirit and emulation among us.

General improvement, the most valuable, is seen in the roads, fences, farm-buildings, and better, neater, and more thorough cultivation of the country.

Agricultural statistics command greater attention than formerly. Experimental farming, with a view to test the extreme point of production the lands are capable of, will be entered into. Experiments are in contemplation, designed to ascertain whether the importation of seed of the staple grains from different latitudes will be productive of advantage, either in quality or time of ripening. Rotation of crops begins to receive some attention, through the example of some who have met with eminent success through its practice. (This is a most important improvement.) Crops are, in general, tolerably well saved, though vast quantities of straw, tops, fodder, and manure are still entirely wasted, in consequence of the short-sighted opinion that the land does not require its use. Many are unprovided with suitable accommodations for stock during our severe winters; yet, in this respect, a gratifying improvement is perceptible. Little disposition exists to introduce new crops, such as flax, hemp, barley, hops, &c., though it is believed many may be grown to advantage. Considerable machinery is used in the field; I think fully seven-eighths of the small grain is cut and threshed thereby: there are some mowing-machines also in use. Much interest is manifested in all sorts of improved implements and machines. The drill is not yet introduced, but will answer admirably, in my judgment.

Horses are almost universally used in the field—very few mules are seen—oxen are not numerous.

The average intelligence is worthy of particular notice, being inferior to no section I have seen in the Union.

Moral character is highly appreciated. Good-fellowship among neighbors, and general interest in country affairs, are marked strongly in our society. Neatness about the homestead is receiving gratifying attention, evinced by the cultivation of shade-trees, shrubbery, flowers, and garden-fruits, such as berries, &c. The means, however, of a great number are insufficient yet to enable them to erect such dwellings as are desirable. Economy, too, is a Sucker virtue. Labor is, in the main, fairly employed, and the laborers treated with deserving consideration: average wages, about $8 a month, with boarding and washing.

The German (chiefly Hanoverian and Prussian) population are generally excellent farmers, and, with the help of their wonderful frugality and industry, almost invariably succeed rapidly. Though not enterprising, they rank among our best farmers for clean fence-rows and well-tilled fields. Much of the field-labor is supplied by them. A desire to educate their children is characteristic with most of them.

The American population is composed of persons from every State in the Union, the mass losing nothing by the mixture, whatever. The country is indifferently supplied with schools, though they are increasing. Teachers' pay is too small entirely, and their responsible vocation not sufficiently appreciated. A disposition prevails to establish societies for the advance-

ment of agriculture, and it is much hoped and desired that the national government will regard, with continued and increasing interest, this department of national industry.

Very respectfully, yours,

JOHN C. COX,
Quincy, Adams County, Illinois.

THOMAS EWBANK, Esq.
Commissioner of Patents.

FRUIT CULTURE.—By Mr. J. C. Cox.

"Is the culture of fruit receiving increased attention?" Yes, very much, particularly the culture of apples. "Cannot apples enough be grown on an acre to render the crop a very profitable one to the farmer?" Yes, undoubtedly.

"What varieties are best to keep for winter use and exportation?" They are numerous. I prefer the annexed list:—Newtown Pippin, Golden Pippin, Rhode Island Greening, Jeanetten, Winter Pearmain, Baldwin, Roxbury Russet, Wine-sap, and Jonathan.

There are several excellent varieties of seedlings produced here, not yet named or classed by orchardists.

Apples generally are good. Some varieties are improved much upon the original stock; with reasonable care and attention, their cultivation amply repays the labor invested. In appearance, size, fragrance, and excellence, we can equal any farming locality I know of.

I have observed that some varieties change their colour when transplanted from abroad. The Kentucky Jeanetten and Pearmain, though retaining the original shape and flavor, assume a different shade of color, becoming much darker, and entirely losing the white and yellow.

"Do you know any preventive or remedy for the 'blight' on pear and apple trees, &c.?" No, I wish I did. Have tried close pruning, washing the tree with weak ley; topping, that is, taking off all the branches, stimulating with ashes and other manure, repeated digging at the roots, girdling the diseased limb, slitting the bark—but without avail.

I have observed that orchards in cold, dry, elevated situations are not nearly so much injured as those in more sheltered places. Have a young orchard on a very bleak spot untouched. My neighbors within a quarter of a mile, on a ridge less exposed, very greatly injured. The yellows in peach-trees is not very common here. I have no information on the subject.

Apples.—Best method of transplanting:—For this locality, move the tree before its diameter reaches 2 inches; take as many of the roots as possible; mark the tree, so as to set it in the same position as to north and south; take off a small portion of the stem or upper branches, handling very carefully. Plant a little deeper than the tree stood before, taking care to loosen the earth at the bottom of the hole in which you place it. Shake the earth well down upon the roots, avoiding the injury of the smaller ones as much as possible.

Let your ground be dry, clean, and cultivate in corn, with as much manure as you please. Avoid trimming, as much as you can, and let your trees grow

without posts to help them. Weak ley is an excellent wash for the bark of fruit-trees. Forty feet apart is an excellent distance for the trees: less than 2 rods is too close. Plant in the spring, the sooner after the frost is out of the ground the better. Use leached wood-ashes for manuring the trees.

Peaches are abundant and of excellent quality, requiring little care in culture.

Pears.—A considerable number are planted; but, being of slow growth, very few have bearing trees. They have suffered more from blight than any other fruit.

Plums.—Not much attention paid to their culture, in consequence of the attacks of the curculio. The tree grows well.

Cherries.—We have abundance of the common red pie-cherry. The finer sorts are introduced, but few bearing trees. The tree thrives excellently.

Apricots, nectarines, quinces grow well and yield finely. Grapes are only cultivated as fruit. The Isabella stands our climate best.

Currants, gooseberries, strawberries, raspberries thrive very well and are plentiful.

Would any communication resulting from observation of forest-trees, shrubs, &c., together with natural fruits, grasses, &c., be of any value, confined, of course, to this locality?

Wheat.—Varieties in use: Red Chaff, smooth ear, much used.
White " "
Red " bearded, much used.
White " " summer, not much used.
Mediterranean Red, not much in favor.
White bearded Tennessee, (so called,) lately imported.

Average product per acre for 1850, about 19 bushels, of good quality. (Note.—I do not think this average would be correct for any previous year during the last six years.) Largest known yield, 36 bushels per acre.

"Seeding time," best from the 20th of September until the 25th of October for winter wheat.

"Preparation of seed" is much neglected. It is usual to select the seed from that part of the field where grow the most vigorous plants, or to take the seed from the pile having the heaviest and plumpest grains after cleaning.

"Quantity used per acre?" One bushel and a peck. If late, 1½ bushels. "How many times do you plough?" Twice if possible. Wheat, covered with the plough, stands our winter better, branches more, and is less liable to injury from falling before it ripens than when covered with the harrow. Depth of ploughing: flush the ground about 4 inches, and plough for seeding about 8 inches.

"Is the yield per acre increasing or diminishing?" I am of the opinion that it is increasing, decidedly, owing to improved farming, and increasing inducement in value, as well as the subdivision of large tracts into smaller farms.

Rotation in Crops.—The most approved system is to follow a crop of wheat with clover and timothy grasses; follow the grass with a corn crop the first year, and wheat the next, or other small grain. The custom is, for the most part, to break the prairie, then put in corn or wheat for ten years successively, reckless of injury to the soil.

Diseases and Insects.—I have heard no complaint of any in this county

this year. There was less cheat than usual at our last harvest. Thorough tillage and winter-fallowing are recommended for the destruction of the Hessian-fly.

Loss of crops sometimes happens from freezing out, from rust, and cheat; the first and last from indifferent farming, generally, however.

Wheat is considered a good crop as to certainty of remuneration.

Corn.—"The most esteemed varieties?" A species obtained by mixing the large yellow corn of Kentucky with the yellow flint, called here smooth yellow; it is prolific, full, smooth grain, covers the end of the cob, hard, sweet—cob brittle. The gourd-seed corn is most planted, both white and yellow. Very little care is taken in selecting seed, particularly as to variety, most farmers merely preferring the color.

"Average product per acre?" Fifty bushels; (have grown more than 100, which is not uncommon.)

Cost of production will vary with the crop. I think corn cannot be properly cultivated for less than $5.25 per acre, estimating labor at $8 per month. A fair average would be not less than 12½ cents for dry corn per bushel.

"Best system of culture?" Land should be ploughed deep during the fall, if possible; this secures the following advantages: 1st. It destroys a great number of weeds, and, at the same time, turns under the surface a considerable amount of fertilizing matter, in the shape of decaying vegetation, which would otherwise be lost. It destroys many insects which live upon the crop; it renders the soil more easy of cultivation at seed-time, and, by exposing more or less new soil, recuperates that already taxed for one crop. It should be again deep ploughed in the spring, after the frost is fairly out of the ground, and planted in rows, about 4 feet apart. Two plants are enough to stand in one hill—three may do well—more than this is too many. Plough till there are no weeds visible after the plants appear, throwing the earth against the plants, and then plough again, to be sure. Corn can't be ploughed too much in this climate. Planting depends much on the season, of course, as to time. I prefer late planting, in order to avoid the frost and the stunted character of the plant when its development is checked by unfavorable weather, such as cold, wet spells, &c. When the plants are quite small, use a cultivator instead of the plough, and when too large to use the plough, use the hoe. In thinning the plants, regard the color and thickness of stalk more than the height. Should the land be lumpy after spring ploughing, smooth with a harrow.

Oats.—Average yield, (5 farms, in fair season,) 36 bushels. Quantity of seed used, 2 bushels and 1 peck. Is an uncertain crop.

Rye.—Scarcely any raised in this county.

Barley.—None cultivated for a crop.

Peas.—None cultivated for a crop—are not cultivated as a renovating crop.

Beans.—Very small quantity raised—are very prolific. Oats are considered the most exhausting crop.

Clover and Grasses.—Quantity of seed used, about 14 pounds to the acre. "Quantity of hay cut per acre?" With reasonable farming 2 tons; I have known 2½; average, 1½ tons. Cost of production $3 per ton.

"Best fertilizers for meadows?" Stable manure is the only one in use here, and answers every purpose. Will increase the yield surprisingly, even upon first-rate land.

"Grass seeds preferred for laying meadows?" Timothy, clean, is first. Timothy, with very little red clover, second. It is supposed that a meadow will thrive better with mixed grass, as the clover shades the young growth of the timothy during excessive heat, and preserves it thereby. Kentucky blue-grass is our best pasture grass. White clover grows spontaneously upon close-pastured land, in timber and prairie, most luxuriantly at this time. I am credibly informed that in the early settlement of the country it was unknown.

Dairy husbandry is much neglected; very little cheese produced.

Root Crops.—Some turnips are raised as a field crop, and are the only one of the list that are so cultivated. No disposition is manifested to engage in their culture as a crop. All of those named thrive excellently as garden vegetables.

Potatoes, (Irish.)—Average yield, 70 bushels. Most prolific variety, Neshanac—most profitable, pinkeye—most edible, Mercer. Cost about the same as corn; say 22½ cents average. Some experiments are being made in their culture: if any improvement be elicited, will report it.

Jefferson Township, Fayette County, Pennsylvania,
December 5th, 1850.

Sir:—I have been at some pains to get what information I could from my brother farmers, and I herewith send you the result of my inquiries.

I live in a section of country every way adapted to the raising of wheat, corn, oats, and clover; the soil is a limestone clay, susceptible of the highest degree of cultivation.

Wheat.—Our average product per acre is from 20 to 25 bushels, and, in some instances, 30. Our varieties are the Mediterranean, the Cape, the red smooth, the red bearded, and latterly the Zimmerman; our mode of culture is varied; we sow on a fallow with two ploughings, which mode invariably insures us good crops. Sometimes we cut off our corn and sow wheat of a late variety, but our principal crop is sown on oats stubble, with lime or manure on the top; our time of seeding is from the 15th to the last of September; the yield of our land is steadily increasing; the land which, 15 years ago, produced from 12 to 15 bushels of wheat, will now, with lime and manure, produce 20 to 25, and could still be made to produce a greater quantity. Our rotation is, first, corn on a clover lay; second, oats, with manure; third, wheat with lime; fourth, clover sown on the wheat in the spring. Our nearest markets are Brownsville and Pittsburgh; prices range this season from 70 to 75 cents per 60 pounds. *Corn.*—Our most esteemed variety is a large, rough gourd-seed, with from 12 to 16 rows, a white cob and long grains. Our average yield is from 40 to 50 bushels per acre. We generally plant on a clover lay, with long manure, ploughed in early in the spring. We then commence about the middle of April to haul on lime, coal-ashes, and any other fine manure we may have, harrow fine, and mark out in squares of four feet each way, and plant from the 25th to the last of April, 3 grains in the hill; our after-culture is to work four or five times with cultivator and double-shovel plough. We keep our corn clear of weeds and grass till harvest. The National Road affords a good market for corn and oats, so that we feed but little to stock; the price this fall is 40 cents per bushel.

Corn can be raised at the rate of from 8 to 10 cents per bushel, exclusive of interest and taxes on the land. Oats we mostly sow after corn, once ploughing; we raise 40 to 50 bushels per acre, and sow 1½ to 2 bushels per acre. We consider oats an exhausting crop, and always lime or manure after oats, to insure a crop of wheat. Barley, rye, peas, and beans are not cultivated with us as field crops; neither are roots for feeding stock. Clover is considered as indispensable to good husbandry. We sow from 10 to 12 pounds of good seed, per acre, on our wheat; we sow in March, and always try to sow on frozen ground, or on snow. We raise from 2 to 2½ tons of hay per acre; cut in June, and reserve the second crop for seed; we cut two crops in succession, and then plough for corn. We sow timothy for permanent meadow on bottom land; hay is now selling for $10 per ton. Cattle and sheep are not raised to a great extent; if we feed cattle or sheep for market, we purchase from a distance, feed during winter, and dispose of them in the spring, when fat. Potatoes are raised in limited quantities, farmers have been deterred by the rot from planting them. *Manures.*—Our farmers are only just beginning to turn their attention to making and preserving their manures. We have, for several years, used lime as a manure, to which we owe the increase in the production of our land. Lime, in quantities of from 50 to 100 bushels per acre, sown immediately before we sow the wheat, increases the wheat crop, and insures us a crop of clover, which we consider the best renovating crop we can sow.

I have given you short answers to some of the questions proposed in your circular: if they will be of the smallest use to you in making out your Report, I shall be highly gratified; if not, you can lay them aside, and give no offence.

Yours, respectfully, JOHN H. FARR.

Rivesville, Marion County, Virginia, December 10th, 1850.

Sir:—I had the honor of receiving, through the politeness of the Hon. Thos. S. Haymond, your agricultural circular for the present year, (1850.) With the expectation of getting the necessary information from the marshal's books, I have delayed completing my report for more than two months, and, for want of their returns, shall be able to give you nothing more than a mere historical sketch of the improvements that are at this time progressing within our county. Our soils are naturally fertile, and highly adapted to the production of the various kinds of grain, as well as grasses. We have hitherto given but little attention to the improvement of our lands, either by any regular rotation of crops or otherwise; and while it yielded an ample supply for home consumption, we were satisfied with the present state of things. The principal market for the sale of our wheat and other produce heretofore has been Pittsburgh, Pennsylvania, the prices being barely sufficient to defray expenses of transportation and other incidental charges, the distance being over a hundred miles. The Monongahela river affords the necessary facilities for transportation, at least in the spring season of the year, by which the surplus of produce is conveyed to the above market. Lumbering, or supplying timber for steamboat building, has, for many years, engaged the attention of many of the citizens of Harrison, Marion, and Monongalia, and been a source of considerable revenue to those counties.

But I may say, with much propriety, the rearing of live stock, horses, cattle, sheep, and hogs have formed the staple of Western Virginia, and been the principal source of the wealth and prosperity of this section of our State.

The surface of the country is undulating and healthy, but its insulated position has heretofore proven unfavorable to the introduction of experienced and practical farmers locating among us. But a new era in the history of our county has at length opened. The time was, when it would have been thought impracticable for a wagon and team to cross the barriers that lay in the way on every side. But behold the change that has been effected within the last six months! The mountains are made to tremble from their very base, by the constant and tremendous explosions in blasting rocks, whose deafening reports arouse the sleeping echoes from their placid retreat, and send back a wild response in tones of thunder. The great railroad from Baltimore to Wheeling is now under a rapid state of being made through the centre of our county, and an active interest in all the departments of industry are favorably conspicuous among the people, especially the agricultural portion of its population. The wheat crop of '49 was extremely light, owing to the rust striking it a few days previous to harvesting. Nothing discouraged, the farmers, in anticipation of the public works that were all centering through Fairmont, our county seat, employed themselves with renewed energy, and perhaps no former year ever witnessed so large an amount of soil turned, or so much grain sown. The result was a favorable experiment, and an abundant yield of small grain of superior quality was our reward.

Corn was never better; oats not so good as '49; but potatoes were better, both in quality and quantity, than they have been for the last 5 years. They were not the present year injured by the disease termed the rot, though the yield was less abundant than before the disease was known in western Virginia. The red-chaff bearded, until a few years past, has been, with few exceptions, the only wheat cultivated in this section of country. The Mediterranean, though of recent introduction, promises a fair yield; being thought less liable to the ravages of the fly and other casualties. Besides raising an amount of produce sufficient for home consumption, there will be more than enough, it is thought, to supply the great number of hands at this time employed on the public works.

I am, dear sir, yours respectfullly,

HENRY MERRILL.

Hon. THOMAS EWBANK, *Commissioner.*

Bloomfield, Somerset County, Maine, December 5th, 1850.

Dear Sir:—In answer to questions propounded in your circular, handed to me by the postmaster, W. S. Parks, of Skowhegun, I would say: 1st. The variety of wheat sown now is principally the Black Sea wheat, the red-bearded wheat, and the bald white, for spring sowing; and the average product per acre (unhurt by rust or weevil) is, or rather has been, about 8 or 10 bushels. The past season has been better. The time of seeding varies from the 25th of April, or as early as it can be sown, to the 10th of June; although, in general, farmers prefer sowing as early as it can be done, or to the 10th of May, or defer it to the last of May. Harvesting is done from

the 1st of September, onward—done before the 20th. Seed is pretty generally washed clear, and lime or wood-ashes added till dry enough to sow, and allowed to stand 12 hours. It is now customary for most farmers to sow 2 bushels to the acre, some even more, on land planted with corn previously and manured, ploughed once or twice from 4 to 6 inches deep. The system of raising wheat has been changed somewhat of late, and considerable has been sown on "broken up" pasturage, which has succeeded well, using no manure: the plaster or gypsum is good. This, with rather better seasons, gives an increasing yield. The system of rotating has never been carried to much extent, as the country is not old, and land plenty, and two or three crops are all we get before seeding down, say one of corn and potatoes, one of wheat and grass, or one of oats or oats and peas, one of corn, and then wheat. No particular remedy for the fly, except having the wheat ripen in the season which is too early or too late for their accommodation. Market at home, and average price from $1.25 to $1.50—1850, $1.50—governed by imported flour. We have succeeded this year in raising a long neglected crop of winter wheat; none having been sown but what has yielded well, some as high as from 35 to 40 bushels to the acre; all that has been sown looks well. This crop succeeded well 30 years ago, but having failed several successive years, it was abandoned. We have for the last 20 years labored under great disadvantages in raising wheat, which began with the fly, then the weevil, and then "blue-neck," blight and rot. Forty years ago, wheat was a sure crop, and the quantity sown to the acre was just 1 bushel, the same as is now sown in the fall; and the yield was uniformly from 20 to 30 bushels, and it may be a question now whether 2 bushels to the acre is not too much: a farmer of my acquaintance began with Black Sea wheat, at the rate of 2 bushels to the acre, and found his crop pinched; he reduced to one and a half, and it was better; and then to one and a quarter, and found it right. Several experiments have been put in operation to test the quantity of seed-wheat in this State, which have elicited what may be valuable information on this important subject. It has been suspected for a long time that our seed was in fault, at least for a part of the deplorable deficiency in the crop, and if, "as you sow, so shall you reap," and every seed shall bring forth its kind, then it follows, if we sow defective seed, we should expect defective crops. I could not see why a flour-mill cleanser should not be the best thing to prepare wheat for sowing, till an experienced miller told me it would kill one-half of it. Reflecting on this fact, I was led to see what effect the common threshing-mill would have, when many kernels are broken in the operation. These suggestions have been experimented upon, and it is found, on repeated trials of samples sown in common saucers and broadcast in the ground, that one-fourth or more of the largest kernels are killed, and never germinate, and some will produce a shoot, but no root—the root-sprout being killed by the machine. This accounts in some measure for our wheat coming up thick enough, but shortly becoming thin. Many kernels, from native strength, shoot up, but, having no strength, die. In our flour-mills may be seen the caps of the root-sprout, blown out by the blower or fan, under the hopper, by quarts at a time, besides that which is blown out above. One farmer told me he had tried the experiment, by accidentally having a barrel of wheat threshed by hand and sown with another barrel threshed with the machine; and the difference was at least one-quarter. Thus it is seen that one-quarter of the seed is killed by the machine for threshing, and then the whole is run

through an ordinary winnowing-mill, all together, and sown from the mass; we raise our wheat, year after year, from about three-quarters of the seed sown, and that of the poorest quality; the best and fullest being killed. Now, to my mind, this is enough to account for the diminution of the wheat crop, from 20 to 30 down to from 5 to 12 bushels. No seed on earth could stand such a test. Formerly, the wheat was threshed with flails, and winnowed in the north-west wind, and then the seed taken carefully from the north-west end of the pile, so that very little was sown but the first order of kernels. What a contrast! Some even went so far as to select heads of the largest and best growth, by pulling them from the sheaves. A gentleman, now on the Supreme Bench of this State, informs me that his uncle followed that course, and had no occasion to change his seed for 40 years in succession. A gentleman of this town informs me that he tried the experiment by selecting a few heads, enough to give a quart of wheat, which was carefully kept and sowed on a corner of the field, and he assures me that he could see the difference in the grain 40 or 50 rods, the plants being a darker green, broader leaf, and taller growth.

A question has been raised whether smut is raised from smut in the seed: and I am informed, by a friend, that he sowed some wheat in a bed in his garden in rows; two rows of good seed produced all good wheat; next two rows, of middling wheat, produced a poor quality, with some smut; next two rows, of the poorest wheat, which was mostly smutty; next, the very smut itself, a small part of which came up, but was all smut. This proves the necessity of improving the quality of seed-wheat, in this climate at least, if we would raise fair remunerating crops. A recapitulation might be well; but I will only say, let every farmer who sows wheat have a sufficient quantity threshed by hand, at least, for seed, and winnowed in a good strong north-wester, if he would have good crops of good wheat.

As for smutty wheat, I would say, with Capt. H——, there is no more need of raising it than of wearing a dirty shirt. In my younger days, when agriculture was not studied, but "*went on itself*," I was on a farm where, for years, smutty wheat had been successively raised, till my ambition rose above it, and, though at the time quite young, I bought 2 bushels of clean seed-wheat, and prepared it, by washing, liming, &c., for sowing; the consequence of which was that I got a crop several shades lighter than usual. Some of this crop I saved for seed, prepared carefully again, and sowed it, from which I got a very tolerable article; and, after the third year, I had no trouble in raising good white wheat and enjoying good white bread—a blessing which I wish every man to enjoy.

Corn.—There are several kinds of corn raised in this vicinity, from the old Indian blacksmith kind to the Massachusetts large eight-rowed, including the Brighton, the Dutton, the sparkled, and threaded. The Brighton is a kind got up by the legislature of Massachusetts, before the State of Maine was set off, and given to the members, by which it became pretty generally disseminated. It is considerably planted, grows large, and produces well; but has a moist cob, so as not to be very easily dried. The Dutton is much like it, ears a little shorter, from 8 to 14 rows, grows well, and is productive. The sparkled is a good variety, much like the old eight-rowed, and produces well. The blood-red is a soft, damp kind, not worth putting in competition with others. There is another kind, called here Piscalaquin corn, eight rows, good ears, small kernels, cob very small, ripens early, and is *the* kind for a bad season. But such are the changes in corn, that a description is

not worth much. I planted the Brighton kind on a light, sandy, alluvial soil, and the second year I had nearly all eight rows, small variety; and the same, put on a clay soil pretty rich, went back again; and the same stalk will produce eight, ten, and twelve-rowed ears. The old Indian corn remains nearest to its pristine state, tall and straight, two ears to the stock, half bluish and half yellow. An average crop per acre may be measured or estimated variously. An average of all the corn, from the drunken blacksmith to the accomplished farmer, would give an idea of the country and manners, but not of the agricultural capacity. An average crop of well-cultivated land may be reckoned not far from 40 bushels per acre, running from 20 to 100 bushels, but may be more under 40 than over. The cost per bushel, on the same estimation, may be put at about 42 cents per bushel. The mode of culture has been materially changed, and much corn is now raised by spreading manure and lime on grass-land worn out and "bush-furrowed," the seed put where the furrows join, by which little labor is required in hoeing. Pasturage and mowing, broken in the early fall, and manured with long manure, and then go over it, before planting, with the cultivator, gives good crop, and the old mode of planting on the stubble-ploughing. In the last case, a mixture of two parts ashes and one part lime, with one-half to a pint in each hill, covered one inch in dirt, especially on light land, gives a good crop at a fair paying rate. Cooked vegetables are generally best; but, in regard to corn, it may be questioned whether it will pay the expense: I think it will. Grind and cook corn, formerly planted 4 feet apart, in rows by three in hills, but recently 3, by crop a doubtful expediency—one ear for two to the stalk.

Oats yield very small, on account of threshing-mills, same as wheat; seed 2 to 5 bushels; naturally exhausting; 5 years kill the land; formerly 20 to 50 per acre, now 6 to 25.

Barley.—Rather uncertain; well sown, will produce from 12 to 30 bushels per acre; not very exhausting; a good article for pork, &c.

Rye.—Mostly sown in fall, and yield all the way per 10 to 30 bushels per acre.

Beans.—Seldom raised alone to any amount; planted with corn; raised per 50 cents; generally sold at $1.

Peas do not exhaust land, rather improve; not sown for the benefit of land; from 10 to 40 bushels per acre.

Butter and Cheese.—Very much neglected; average to the cow, 100 pounds cheese and 100 of butter; many cows kept for stock-raising, and nothing else.

Neat stock.—For 3 years old, prices vary greatly; from 15 to 50 in market; giving 15 for raising, the large ones cost more. Cows worth in the fall from $12 to $20; in the spring from $16 to $30; extra, $50 to $100. The kinds of cattle are not kept apart, but much attention is given to stock, and successfully; all fine yoke oxen must be 7 feet in girth, and many come to that standard.

Sheep.—Wool is considered worth raising as a business when worth 25 cents the pound. Coarse wool, on the same kind of sheep, is not so good as a paying business; but the coarse-wool sheep need a little less attention and are as good mutton.

The large Dishley sheep produce good mutton and great fleeces—very hardy; but the Merino sheep are generally kept for profit. The difference in price is about equal with the cost—say from 24 to 34 cents from the sheep.

The subject of raising is badly understood and badly attended to, on account of the fluctuations in the prices produced by partisan legislation. Well might Mr. Hamilton say to Mr. Calhoun that a certain eight years had cost the nation $500,000,000. Sheep are too often kept for the purpose of killing the bushes in the pasture—consequently poor, the lambs are allowed to run with the dam till they wean themselves, the best sold off, and the flock kept good from the remainder: allowing for death and accident, no small amount. In this way, flocks soon run down, and well they may, and must be changed. Instead of this, if sheep could be kept well in winter, and bring their lambs by April, and let the lambs be taken off by the 1st of September, the sheep would all get fleshy by fall, and go into winter capable of standing the rigor of climate. The lamb would not be seen gazing at hay and provender, not knowing what to do, but go right to eating and winter vastly better; and by this means the ram is kept from them, if you please, so they do not yean the first year. The old sheep are in good case, and very little feeding will fit them for market.

The proportion of lambs to the ewes is, probably, about two-thirds, and, with the above rules observed, might be raised to seven-eighths. Sods of turf should be piled where sheep can get them in long snowy winters. Soot and salt, with a quantity of meal, are very good. Hogs are of all varieties and mixtures. We can't compete with the West in this article.

Cotton we wear out, but raise none.

Sugar-cane the same.

Rice the same.

Tobacco.—Everybody uses it, but produces none to count. It used to be raised considerably here, and is raised in Canada now.

Hemp.—This article has been tried, but did not succeed very well. Rather exhausting as a crop. It may come up again when we get railroads and have less lumber.

Potatoes.—Irish potatoes were one of the staple articles of the farm till the general blight, and numerous starch-mills were erected, which promised a lucrative business; but our hopes are blown to the moon for the present. The best kind of potatoes, every thing considered, is the old Spanish or English white, or the pinkeye, nearly alike. Most other kinds have objections: the Chenango rots more, the red is not good for the table, the Christi wants very rich soil, and so on of Butnene lady. The best method in raising them is to plough pasture land in the spring. Harrow and plant all good-sized, either cut or whole; put on gypsum or plaster of Paris. A thousand conjectures have come to light as to what constitutes the disease; but facts seem to baffle every one. No two fields, no two hills, no two positions of the same seed or location, high or low, dry or wet, produce the same results, but right contrary. My own opinion is, that the same disease attacks potatoes that does wheat, and they both came suddenly and may go as suddenly. I observed that something ailed potato-vines several years before the rot commenced; the tops rusted and died where they used to keep green till frost came. I had pens of potatoes near my stercorary, (hog-pen,) on which the vines grew large; and, wishing to dispose of them, I put them into the low wet ground in the yard, on which I piled a quantity of pamplain vines, making a cart-load. In November, I pitched the whole over, to give them some chance for rotting, and in the mass I found attached to the stalks of the potatoes thousands of maggots, resembling, in shape, color, and size, the weevil. It would seem that the fermentation had produced the requisite

amount of heat to hatch them out. They were in rows on the stalks, and appeared to have been deposited along the little ruffle on the stalk. What would seem to corroborate the hypothesis is that, where corn and potatoes have been planted one year, and wheat sown on the whole ground the next year, that part where the potatoes were planted will be doubly injured to that of the corn.

Sweet potatoes are not cultivated nearer than about Boston, to my knowledge, and there they assimilate to the Chenango, so that little or no preference can be given. I think that they are the Irish potatoes varied by climate, little else.

We have a native ground, not exactly resembling the sweet potato in vine-leaf and blossom. I think that might be mistaken.

Fruit culture is new business and in infancy. Much is going on in the line, and will give ample results in a few years. Orchard lands have been too prevalent. When I was a boy, I have heard the remark, that we could raise apples to eat and some cider, but could not have cider like Massachusetts. Every one set out trees to try it; now, were the trees in good condition, and not killed by ploughing, we could expect a million bushels of apples in a year. I am entirely against cutting off the top roots with the plough share. Enrich the ground with coarse any thing, and cut out the middle of the top, so as to let the sun in.

Manures.—We are beginning to use lime considerably for manure, and salt and alkali, on Baumer's plan. Every farmer uses all his manure, and spreads it on all his cultivated land, probably one-eighth of what should be used. Good farmers put on all the way from 20 to 60 loads per acre.

Thus I have hastily gone over with most all the questions propounded, very imperfectly; and, if you find any thing worth notice, you are free to use it. The remarks on wheat are very strongly set in my mind, and, I think, worth perusing in the Northern States and the older Southern. In the virgin West any thing will grow. The remarks on sheep, too, are applicable to the North and Middle States, but not to where no winter is.

Very respectfully and with much esteem,

Yours truly,

EUSEBIUS WESTON.

WOOL AND WOOL-GROWING.

Nashville, Tennessee, October 21st, 1850.

Sir:—Your favor was duly received, and I cheerfully make a communication for your Annual Report, on the subject of wool-culture and sheep husbandry in the low latitudes of the United States. Observation and many years' experience have brought me to different conclusions from all others who have written on this subject, upon the effects and influence of warm climates on wool-growing, and especially upon the finest Saxony wools.

In a letter addressed to the Commissioner of the Patent Office, and published in the Report for 1848, page 627, I expressed the opinion "that the United States are a better wool-growing country than any portion of Europe; that the *low latitudes* have an advantage over the high, and will produce

finer wool; and also, that as fine wool is now grown in the United States as can be found in the world."

I stated further that I had studied this subject with diligence and devotion for 35 years, and thought I had come to correct conclusions; but the Commissioner, Hon. E. Burke, decided that I "was wrong, and most decidedly mistaken in the whole matter," and that Mr. Fleischman's views, who had said that we must go to Germany for sheep, if we hoped to succeed, were no doubt correct. Still confident that my long study and experience had not misled me, when the Commissioner published his Report and remarks, I addressed him a letter, which may be found in the "Plough, Loom, and Anvil," page 366, December No., 1849, offering to exhibit selections from my own flock, in latitude 36°, against any sheep which could be found in all Silesia, or any high latitude in Europe, and especially above 50° north latitude. This offer has not been accepted, and I have no fears of the result, if it ever should be.

It is gratifying now to refer to the impartial evidence of science in favor of the positions then taken. I was certain the facts existed, but I did not know that the researches and inventions of our countryman, P. A. Browne, Esq., of Pennsylvania, would so soon present the testimony in so satisfactory and tangible a shape. Mr. Browne practised law for more than 30 years in the city of Philadelphia; retired from practice, he has devoted years to the study of hair and wool, aided by the lights of others and his own inventions. I consider his examinations, therefore, entitled to full faith and credit.

From two letters addressed to the Hon. R. R. Reed, of Pennsylvania, and myself, published in the May No. of the "Plough, Loom, and Anvil," 1850, I beg leave to make a few extracts, which show important results to the United States, because it places her at the head of the list of all countries for fine wools.

Mr. Browne examined 65 samples, or collections of samples, from all parts of the world, and especially the 18 samples brought over by Mr. Fleischman, from the most renowned flocks of Europe, and distributed, through your office, to the several States, as the standards of excellence, and worthy of imitation.

The quality is expressed by the number of fibres which will cover an inch; or, the diameter of one fibre is that fraction of an inch. The low figures indicate the coarser wools, and the high figures the finer.

		To an inch.
No. 4.	Common American wool	500
" "	The wool of Leicester (England)	500
" "	The Irish long wool	560
" 17.	Wool of Odessa	750
" 31.	Three-quarter American Saxony	1041
" 32.	Wool from the herd of Dambran, improved by buck from Prince Lichnowsky, by C. L. Fleischman	1093
" 34.	Lamb from the Duke of Leitchenan, in the possession of Hon. R. R. Reed, Pennsylvania	1093
" 37.	Wool from buck "Napoleon," valued at $1500, owned by M. Heller, of Chrezelitz, whose flock is considered the only rival to that of Prince Lichnowsky, collected by Mr. Fleischman	1200

No. 38. Wool from a buck of the herd of Reti, from Hungary, by Mr. Fleischman..... 1200
" 39. Ewe of Prince Lichnowsky, Kuchelna..... 1250
" 40. Buck of Roggon, in Mecklenburg, collected by Mr. Fleischman..... 1250
" 42. Ewe from the Duke of Leitchenan, dam of the ram of Hon. R. R. Reed..... 1250
" 45. Another ewe of Prince Lichnowsky, by Mr. Fleischman... 1562
" 46. Buck, near Moscow, Russia, by same..... 1572
" 47. Buck of Prince Esterhazy, by same..... 1572
" 50. Ewe of the herd of Guettsnandorf, celebrated for its thorough blood, by same..... 1580
" 51. Buck of the herd of the Viceroy of Hungary..... 1600
" 54. Buck of Gross Herlitz, Silesia..... 1875
" 61. Specimen from a wool-merchant, Dresden..... 2186
" 57. Ewe of Colonel Randall, New York..... 1875
" " Specimens from 5 ewes and 5 bucks of Mr. S. Patterson, Pennsylvania..... 2186
" " Specimen of Colonel Lee's flock, Pennsylvania 1875
" " Flock of Mr. Robert Allen, Virginia 1875
" 65. Five specimens from the flock of Mr. Mark R. Cockrill, Tennessee, as follows:—
" 1. 1572
" 2. 1875
" 3. This is a beautiful even wool..... 1875
" 4. This is a clean even wool of the extreme fineness of..... 2186
" 5. Not uniform..... 2186
" 5. Some strands in this specimen..... 2500"

The above is the evidence of scientific instruments in the hands of a gentleman devoted to the investigation of this subject, and fully sustains my position, that the United States are growing as fine wool as Saxony, Silesia, or any other part of the world.

Mr. Fleischman recommended, in his report, that wool-growers should go to Chrezelitz and give Mr. Heller $1500 for such bucks as "Napoleon," for the purpose of improving the *quality* of our wool. Compare the sample from Napoleon with the samples in Mr. Brown's cabinet, from New York, Pennsylvania, Virginia, and Tennessee:

United States samples..... ·1875, ·2186, and ·2500
Napoleon—rival flock to Prince Lichnowsky..... ·1200

Was I mistaken, then, when I said that as fine bucks could be purchased in the United States for $50, as those in Germany which are valued and sold at $1500? What improvement in *quality* of wool would such a buck as Napoleon be to the flocks of New York, Pennsylvania, Virginia, and Tennessee, which grow the samples in the above collection, running from 1500 to 2500, whilst he wears a coat, grown in the snows of Northern Europe, of only 1200 to the inch?

The sample from the flock of Prince Esterhazy, of Hungary, is 1572. This Hungarian prince, it is said, owns a flock of 3,000,000 sheep, and 4,480,000 acres of land. We have a right to suppose that he has done every thing that wealth and leisure could accomplish in *that latitude*, to

improve his flock. Yet, would a buck with a fleece of 1572 be an improvement upon our ewes in the low latitudes of 36°, which bear now the "beautiful even fleece of 2186?" The same remarks apply with equal force to the flock of Prince Lichnowsky, of Kuchelna, whose samples are 1250 and 1562.

I cannot omit a notice of a remark of Mr. Fleischman, at page 306. He says: "It has been found that the highly improved sheep do not last well in America, and that the wool grown in America by the German sheep does not at all compare with that grown in Germany."

I can excuse Mr. Fleischman's partiality for his "fatherland," but I should do injustice to our own country not to challenge a test of such statements. I hold directly the reverse of both these propositions, and, on the subject of wool, refer to the testimony of Mr. Browne, who deserves from our wool-growers a service of plate and a suit of clothes from the "beautiful fleece of 2186," for his investigations in this important product.

There is a traditional belief entertained by the greater portion of the world, that sheep by nature belong to a *cold country;* and that when they are removed from a cold to a warm climate, the wool will grow coarser. My observations and reflections on this point have convinced me that, when the latitude is not below 30° N., the reverse of this tradition is true. I believe that the improved Saxony sheep, brought from the snows of Russia to Texas, in the United States, will produce a finer, evener, and fuller fleece than while in Russia. I think the evidence is pretty conclusive that the Merino sheep are natives of the orange groves, and are fitted by nature for the warm climates generally. Climate is a law of nature, and her laws are in harmony. The animals fitted for warm climates are most healthful and vigorous under the action and influence of these laws. The elephant, lion, and camel are organized to bear with healthful influences the long-continued heat of Africa, and the white bear grows fat on the ice of the Arctic seas. I can with confidence say to all husbandmen in the cotton districts of the United States, that, for growing fine wool, they have nothing to fear from climate.

I consider Texas an admirable location for wool-growing, as there is a scarcity of timber, and it is not so well adapted to other agricultural pursuits. The prairies are productive of grass without the labor of man. The winters are mild, open, and warm, furnishing green food, with a regularly growing fleece throughout the year. Population sparse, and lands cheap, requiring but a small capital to engage profitably in the business. Our population is rapidly increasing, and must continue to do so; and last year we imported nearly 20,000,000 pounds of raw wool, besides the woollen goods which we annually take from foreign countries. These are strong facts in favor of a continued demand for wool.

Though cotton, the happy gift of heaven to that class of men blessed with the fewest comforts of life, is steadily in competition with all other materials for coarse goods, yet there are appropriate uses for wool which nothing else can supply. The cotton district, embracing 10 States, and about 500,000 square miles, presents a wide field for the growth of wool. The resources of the South are but partially developed, and I am happy to see Southern opinion awakening on this subject. The spindles and looms are coming to the cotton fields, and when they are up, the cotton crop alone will yield $150,000,000 per annum. The wool crop, at 20 sheep to the square mile, will yield 30,000,000 pounds, besides rice and sugar. We have

spread over our cotton territory, and the great enterprise of opening new cotton States is nearly closed. We have about $750,000,000 invested in the growth of cotton, an enterprise of comparatively but a few years, and the addition now of the spindles and looms in the cotton fields will double the product of this great growing capital, and insure consumption by furnishing coarse goods for the laborers of all the world, at cheaper rates than they ever have been or ever can be furnished elsewhere.

The cotton district of the United States is to become, in a few years, the dispenser of a great public charity, by furnishing the laborers of many portions of the world with the cheapest clothing made in Europe or America. The wool crop may be grown in the cotton district, without diminishing the latter, and thus add to the resources of the South. All the cotton region is adapted to wool and sheep.

In my estimation, the South is not dependent and not weak; but rich in natural advantages, and now ready to say she will turn to account the gifts of nature, and show the strength of her position. No power at home or abroad has any just right to interfere with our domestic relations, and thereby disturb our quiet, and arrest the full development of our resources.

I have said that the low latitudes of the United States will grow the finest Saxony wool, finer than Silesia, the boasted province of Europe. I am also satisfied that the intellect of the Caucasian race, under the genial influences of our southern sun, and the effects of our domestic relations, is more rapid, more polished, and more brilliant than it is in the higher latitudes of our own country. Mind is power; and the South may add this to its other natural advantages; and these powers, when developed and understood, and associated in harmony, point to a prosperous destiny.

I am, very respectfully, yours,

MARK R. COCKRILL.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Spring Cottage, Marion County, Mississippi, Nov. 6th, 1850.

In reply to a circular of the United States Patent Office, forwarded to me by the Hon. A. G. Browne, I take pleasure in answering such questions as apply to the production, manner of cultivation, &c., of this section of country.

Cotton.—The average yield, on the bottom lands, (no worm,) 400 pounds clean cotton, on uplands, 150 to 300 pounds; cost of production per pound, 6 to 7 cents. Corn yields best after cotton, and, to keep up or improve the fertility of land, sow down between rows of corn from 3 pecks to a bushel of peas to the acre; plough them in lightly, or harrow them over. The next season, sow the same land down in rye or oats, which may be fed off, first by horses or cattle, and then by hogs, so as to tread the straw down. About the 1st of July, sow the land down with peas again, pick or feed them off, and the land is again in good condition for cotton. The oat or rye stubble and straw and pea-vines decompose in less time, perhaps, than any other vegetable matter, and lighten and improve the soil. In regard to subsoil ploughing in the cultivation of cotton, so far as my experience extends, and from observation, I am satisfied that subsoil ploughing will

prove beneficial only in strong clay and prairie lands, and upon light and sandy soils will prove injurious.

My mode of cultivating cotton is to bed up with turning-ploughs, in January or February, 3 or 4 inches deep, 5 feet rows on bottom land, and 4 feet on upland. At planting-time, 10th to last of March, sweep the top of the bed with a broad sweep; follow the sweep with a heavy harrow on the bed; then open the bed with a small, light scooter-plough; sow the seed moderately thin; cover the seed with a light harrow. In the first ploughing of the young cotton, commence in the centre or middle of the row with a turning-plough, and turn to the centre, forming a bed between the drills, until the young cotton is scraped; second ploughing with the turning-plough, commence near the drill, raising the bed as much as the cotton will permit; third ploughing, run one furrow on each side of the drill, still raising the bed, and finish the row with shovels; then harrow and sweep the residue of the season alternately, as may be necessary.

The object of bedding up the land in January or February is, that it may settle down by planting-time to an ordinary firmness, so that chilling winds, cold dews, and the rays of the sun will not penetrate so deep about the roots of the plants and kill them, as is frequently the case, when the earth is light and fresh at the time of planting.

Cotton should not be ploughed after the 20th June, if it can be avoided, as it shoots out many small fibrous roots; and to plough deep and cut its roots after it commences forming and maturing, will cause it to drop its forms, check its growth, and seriously damage the plant.

Boll and Army Worms.—Some experiments have been made, and several things recommended as preventives against the army and boll worms; but none has as yet proved effectual. From observation, I have discovered that the army-worm makes its appearance about the farm first, in the shape of the *grass-worm*, as it is called, and generally at particular points on the lowest basins, hollows, or levels; from that it spreads over the farm, maturing usually two generations, by which time they will generally consume the grass. They next appear on the cotton, at particular points, as on the grass, if the season is favorable for their production; but if it be dry or showery, and a change occurs about the time of their coming to maturity, from wet to dry, or from dry to wet, it destroys them. If, however, they so mature as to commence on the cotton, no change of weather will then affect them until they consume it entirely; the cotton protecting them effectually against all changes of weather.

The worm is deposited on the cotton-leaf, by a small bug, or light brown-fly, (resembling the ordinary candle-fly,) at twilight, in the evening, and morning, a live, kicking mote of a worm, and commences its ravages immediately, attains its growth in 10 or 12 days, furls itself up in the leaf, and forms a chrysalis, from which a fly hatches out in 9 or 10 days, and commences depositing the little eggs again.

I this season, having noted the points in my farm where the worm usually first assails the cotton, had torch-fires raised on stumps and other places, elevated a little above the cotton, in a circle or line about these points, to burn from twilight to full dark at night. I noticed that great numbers were singed down by the torches, while the grass-worm was consuming the grass. My cotton has not been touched by the army-worm, and very slightly by the boll-worm, this season: but I would here remark, that plantations around mine, where no fires were raised, have also escaped the ra-

vages of the army-worm this season, though more injured by the boll-worm, than mine. The antidote this year has been, I conclude, in the dry season, commencing about the time the worm usually quits the grass and assails the cotton. I am, however, still of opinion that the use of torch-lights about the points and at the time designated will prove beneficial to farms, not only against the boll-worms, but many other insects that damage the crops to a great extent. There is scarcely any kind of insect injurious to plants, grain, or any other crop, that is not in the form of a fly or bug, between the 20th June and 1st of August. All are attracted by fire-light at that season of the year, and will hop or fly into the fire when near it, and thus be singed down and destroyed. In support of the position here assumed, I will cite two or three small experiments upon insects that have proved effectual preventives, to wit: the carrying of a pan of fire or large torch, at parallel lines near the surface, slowly through a garden or turnip-field at night, while the plants are small and being devoured by a small black bug that most persons are familiar with, will so consume the bugs by their hopping into the fire, as to relieve the young plants entirely.

I this year tried the torch in my smoke-house, by passing it at night, once a week, between my ranges of bacon as it was hanging, and succeeded beyond my expectation, in clearing it of skipper-flies, and bugs, and their effects—*it should be commenced early in the spring.*

I have also exterminated the fleas about my barn-yard, by having a number of small fires made on the ground about the yard, into which they hop at night. These uses of fire should be attended, or superintended, with due care. I shall continue the experiment about my cotton fields until I am satisfied of the effect. This I conclude will be but a partial and limited preventive, until a general and simultaneous effort is made throughout the whole cotton-growing region; as I well recollect how rapidly the worm spread when it first made its appearance.

Corn.—The most esteemed variety in this section of the country is the white, long-grained gourd-seed, as it is called. Average production of upland 15 to 20 bushels per acre; bottom land, 25 to 30 bushels. Cost of production per bushel, 50 cents.

Manure.—Little is done or attempted in this country in the way of manuring. The principal reason is, that the grants of lands, as made by the French, British, Spanish, and first land sales here by the American government, were of large tracts. The holding of large bodies of land encouraged the planters to plant extensive crops of cotton, making heavy crops of which gives the planter no time to manure. As his land becomes exhausted by cultivation, he clears more, rather than manure. Holding large tracts, as most planters do, the only efforts made to renovate the lands reduced by cultivation are to change the cultivation occasionally from cotton to corn, and to rest portions. Cotton-seed is used as a manure, but is frequently poorly managed, and with but ordinary success; it is an excellent fertilizer, if properly applied and well managed. The proper method of using cotton-seed as a manure, is to sow it down on the land in January, 20 to 30 bushels to the acre, and plough it under: thus the seed will be sufficiently decomposed to give support to the crop as soon as the grain gets up; thus the support is gradually attained by the expansion of the roots of the plant, until it is matured, and the crop is not injured by too great heat in the decomposition of the manure or seed. Cotton-seed, when applied on the hill, as many do, if the season proves drier than usual,

either fails to decompose, or produces so much heat as rather to injure the crop than benefit it. On the hill, it only gives a good crop in very fine and uniform seasons.

Plaster and Lime.—I have used plaster two seasons, by dropping an ordinary spoonful on the hill of corn when two or three blades high. I believe it paid me about 25 per cent. above what the land would otherwise have produced. I also, with a view to a preventive against worms in the ground, soaked my seed-corn in strong copperas-water, 1½ to 2 pounds to the bushel, 18 to 24 hours immediately before planting; I then rolled the grain in lime. As the result of this experiment, I will say that I never saw corn come up better, or look better; and I think this an effectual preventive against all insects, such as ants, woodlice, worms, &c., that assail the seed in the ground.

Sweet Potatoes.—Average yield per acre, 150 bushels; cost of production per bushel, 20 cents. The *red* are most prolific and profitable to feed to stock; the *yam* and *Spanish* are best to keep, and for family use.

The best mode of manuring and culture for sweet potatoes, upon old land, is to rake up trash, straw, and leaves, in the forest bordering upon the farm, haul them in carts or wagons, and spead them in lots intended for potatoes 3 or 4 inches deep. Keep and feed cattle on them in the early part of the winter, until the straw and leaves are trod to small particles; then take the cattle off, plough the matter under, and let it lie until spring. Plant in April, run the ground off at 3½ feet, turn it up into beds with turning-ploughs, draw up one side of the bed with hoes, make chops with the corner of the hoe on the bed, at about 8 inches apart, drop two cuts of the potato in each chop, draw up the opposite side of the bed with hoes, and cover the potato. When they require working, plough the bed down, turning the earth off to about 6 inches, that is, leaving 6 inches of the line as the potatoes stand, and scrape the grass off with the hoes. In 10 or 15 days after plough the earth up to the bed again, and draw the earth with the hoes up to the bunch, barely leaving the bud or top clear. They will then require no more working until ready to dig. The last-mentioned mode of manuring is preferable, in this climate, for all root crops and all varieties of vines.

Cattle.—Upon the pine region of south-east Mississippi, covering about eight counties of Mississippi, two parishes in Louisiana, and two counties of Alabama bordering upon Mississippi, forming a square of about 200 miles, there have been raised, I suppose, for 20 years past, one million head of cattle yearly. The beef is sold, at 3 to 4 years old, from $10 to $12 per head. There has been considerable falling off in numbers for a few years past; and some degeneracy in the stock, by reason of the winter range being overstocked, and, to some extent, exhausted.

Sheep and Wool.—Throughout the pine region, as before referred to, sheep are as healthy and prolific as in any other climate, and the various breeds yield wool as well. They require no feed, summer or winter; the winter herbage and evergreen shrubbery are as abundant in winter as in summer. With all these advantages, there are but small flocks of sheep kept, barely for domestic or family use. The Merino and Saxony are preferred for wool, and the Southdown for mutton. No effort is made here, as yet, to improve the breeds, or to grow wool for market. The business will, I think, soon be commenced, and be pursued with energy and profit. The pine region is a high, dry, open country, thickly coated with grass, herbage, and interspersed with spots and strips of shrubbery; it is very sparsely settled,

and abundantly watered by springs, branches, and small rivers of the best water, perhaps, in the world; all that can be desired for wool-growing extensively. I know of no reason why this scope of country should not grow two millions of sheep, as well as one million and a half of cattle.

You will perceive that little improvement is made at the South in agricultural pursuits generally; some reasons for which I have referred to. A much greater variety of crops may be profitably produced than now is, as I have seen fair experiments made in rice, flax, tobacco, (Havana cigar,) indigo, &c. But cotton and sugar are the all-engrossing articles that supersede almost every thing else.

Supposing that it is as much the object of your inquiries to ascertain the prospective resources of the country to some extent, and the manner of culture and present production, I have written, on some points, at greater length than on others. I would here further remark, that there is a great want of facilities for markets to encourage the development of the resources and productions of this part of the country.

Very respectfully, your ob't serv't,

EBEN'R FORD.

Hon. THOS. EWBANK,
Commissioner of Patents.

Edwards County, Mississippi, September 6th, 1850.

Sir:—In compliance with your request, I will endeavor to give you as faithful an account as lies in my power, of the agricultural interest of this State.

I will take your queries *seriatim;* and, passing by those to which I can give no satisfactory reply, will give the results of my own observation, or of my friends and correspondents. And I would here remark, that I may be thought to give preference to some things when not deserving, and to detract from others their just due. I confess myself liable to err; but, as I write for myself, I must freely give my own convictions.

Oats.—I have used the *ruffled, black,* and *Egyptian* varieties. The last I prefer, on account of being able to sow in the fall, and even without the land being ploughed. These oats give a good feed to hogs and milk-cows during the winter, without injury to the crop, if not stocked too close, nor stock permitted to feed during wet weather to cut up the land. If oats be cut high, so as to give but little straw, cut when barely turning, and then passed through the cutting-box, they make an excellent food for stock; but I am not so much pleased with them as formerly, thinking work-horses suffer from the distension of the stomach, thus encroaching upon capacity of chest. I have never used oats alone, nor are we, in this country, in the habit of noticing the yield. Not so much sown this year as usual.

Indian Corn.—I have planted many varieties; but prefer a kind between the flint and gourd-seed for feeding, and for yield of nutrition; for I think the same measure and, perhaps, even weight of gourd-seed possesses most of the covering of the grain, which is not nutritious. The shuck is better food for work-horses than the blade, weight for weight. This is merely conjecture, however, and I act upon it by cutting up my shucks with the blades. We are too negligent, in this country, to make accurate experiments

about these matters. I prefer grinding and cooking grain for hogs when fattening, having practised it for years. I rate the saving at one-third.

The corn crop will be larger this year than last, yet there are portions where it will not be an average one. The scarcity of the crop of 1849 has caused 9 planters out of 10 in Middle Mississippi to go to the corn-fields in August. This will cause a demand for corn in 1851.

Hay.—The planters of Mississippi use the blades of corn, called in the South *corn-fodder*, in lieu of hay. There has been a larger quantity saved this year than usual. I have saved over 700 bundles per hand, with a good load of forage per hand, consisting of native grass, millet grass, and corn cut up when a little past the roasting ear. I save more provender than an average. Estimating my fodder at 1¾ pounds per bundle, which, when I have sold, I have found it to average, and a load of forage equal to a load of fodder, and I have saved nearly 2500 pounds per hand. This, say 1¼ tons per hand, would give to Mississippi, counting only negroes as laborers, at 100,000 field hands, 125,000 tons. In 1848, taxes were paid on 271,052 slaves. No returns have ever done justice to the *hay* crop of Mississippi.

Cotton.—This is our reliable crop: but, for several years, the seasons and the army and ball worms have become so unfavorable, that it has become very uncertain how to calculate. In 1846–48, and '49, my crops averaged about 6 bales, in 1847, 9 bales per hand—over a bale per acre. This year I do not expect over 1000 pounds per acre—about 6 bales per hand. I think the crop of Mississippi for 1850 will fall short of the last, and, instead of making 500 or 600 thousand bales, I cannot place the crop over 450 thousand, and it is very probable it will not exceed 350 to 400 thousand. Much of the crop looks well, and, to the inexperienced or the hopeful, there appears the prospect of a fair crop.

Last year, I expressed the opinion that the whole crop of the United States would be 2,000,000 of bales, not to exceed 2,200,000, nor to fall under 1,800,000. The result has well sustained that opinion. Again, I venture my opinion for 1850; yet saying the information is so contradictory between private letters and newspapers, that I am less sanguine than usual. Were I wholly ignorant of the peculiarities of the plant and of planters, I should incline to place this crop one with that of 1849. But I know of much cotton planted over in April, May, and even in June. I know the season was worse here than in 1849; I know there was more replanted (seed planted, where the stand was too good to plough up, and not a full stand either,) than I ever knew before; and I know, from my own fields, that replant cotton, and that in May and June, looks so well that it will deceive. And, besides, the very late fall last year gave a great advantage to the short crop of 1849: for there was no killing frost until 3d December; whereas I have known a severe frost 5th of October. Taking all these things into view, I place the crop of 1850 at 200,000 bales less than that of last year. The improved seed now planted will add materially to the grand total; and, owing to that, I may be mistaken in my estimate. For instance: I have about 40 acres planted with Mexican seed; if all my crop had been so planted, and all yield equal to this, I should not count over 800 pounds per acre, and really think 700 would be nearer the mark. My crop is always open to inspection; I procure the best seed of each variety, and am willing to send "for persons and papers," and submit the case to a jury of all the cotton-planters. Of the many who have seen my crops for 4 years, there is not one, I think, who doubts that upon best land my select seed

yields 200 pounds more, and upon poor land nearly 300 pounds; and this year the difference is greater. I do not confine myself to any one variety, nor to that as it turns out from the field. I select yearly, so as to keep up purity, and, when a better seed is sold, I buy a few and try them: if good enough, I adopt.

This brings me to varieties:—1. I name *Sugar-loaf* as the best. I have tested it, grown upon rich and fresh land. Its good qualities are production, early ripening, and easiest of all others to gather. Seed sent to me by Mr. Farmer, Last Chance, Miss. I have grown five crops and selected seed from the field four years, and shall do so this year. I have always grown it upon rich land, and was so much pleased with the first year, that I resolved to improve on it, and, if it held its own, to adopt it as the main crop for this place. I think it has improved, as is shown by general resemblance.

2. The next in value for production is the *Banana*. Seed procured from David Gibson, Vicksburg, Mississippi. Maturing and picking qualities yet to be tested, as this is my first year.

3. The *Brown* stands next, and, upon rich and fresh land, it should stand second. This variety is the only one that has been placed equal, or superior to *Sugar-loaf*, by many of my friends living in the east part of Hinds County. I have tried the *Brown* cotton three years, and am sure any person would give it here, at this time, a good character, but not an equal or a superior to my pet, side by side, as it now stands.

The resemblance between Nos. 1 and 3 is close, but the *Sugar-loaf* has less leaf, smaller, rounder, and thinner-hulled bolls, and matures earlier.

4. *Vick's* 100-*seed*.—I have this variety 4 or 5 years, and up to this period it has stood next to No. 1, and give it richer land, a year or two more age, and it will equal it. This year, upon the same plat of land as the above three varieties, it has fallen back, making too much wood. This may be caused by all my seed being fresh from Deer Creek, where Colonel H. W. Vick, the spirited selecter of this variety, plants. I sold out all my own seed, with the view of getting a fresh stock, which was a damage to my general crop: fresh seed never has here given so good a crop.

I have the Hagner seed planted here; it has been selected two years. It was originally procured from W. H. Prout, of Tuscumbia, Alabama, who sells it under the name of *Cluster*. The *Cluster* procured by myself from Prout is nothing better, if as good as the above.

I have learned from Mr. Prout, that he procured his first seed from Georgia, Hancock County, I think, but this matters not; he has introduced seed extensively as Cluster. William Hagner, of Warren County, Mississippi, his brother-in-law, got his seed from W. H. Prout, of Tuscumbia, Alabama, and having quit planting it,—so his neighbor, Mr. Corwin tells me,—I will try and drop the name of *Hagner* cotton.

I now say that the *Cluster*, *Multiflora*, *Moneybush*, and *Royal Cluster*, were all originally from Prout. The *Banana*, I believe, is a better article, but not as above, as I know from his letters from the gentlemen in Georgia, where he had the first start; but yet it is the Cluster. The *Pomegranate*, General Mitchell avers to me, is not of the above, and that he has produced it by crossing. I say, after examining 50 acres or more, it is the same as the above, only improved very much by selection. I would prefer the character of a careful, patient planter, who improves, to that of the producer of new seed; but every man to his liking. The *Pomegranate* is more defined as a

variety than the *Banana*, *Royal Cluster*, or *Multiflora* is here. How it would do on this soil, I know not, which is the only way to truly ascertain the difference; because General M.'s land, like most of Warren County, is peculiar to growing all cotton with short joints, much the reverse of this place, in the swamp of Big Black. The *Multiflora* is more free from the green seed than any I have yet ginned. The *Banana* is here for the first time.

I feel assured that your readers in the cotton region will not complain at the length of this, as I am known to be more devoted to experimenting with seed than almost any other person. I therefore make no apology.

Peas.—In my anxiety to get to cotton, I overlooked this article of Southern culture. Peas are mostly cultivated for stock-feed, and many think them equal to an ordinary crop of corn. They will fatten all stock as quickly as corn. I only use them as an improver of the soil, though I will fatten my *pork* hogs in my pea-field; no other stock will be allowed free access. The pea-vine, when well cured, makes a superior feed to fodder, but how much, pound for pound, I know not.

Peas seldom sell at less than $1 per bushel. Last year, they sold at that price, I think. We plant, most generally, the *Tory* pea. It being more hardy, and less liable to rot, it will lie on the earth all the year and vegetate. I am now trying a new variety, that is, new to me, the *Shinney* pea. Thus far I am pleased with it, as it is now bearing, whereas the *Tory* pea, though planted a month and a half earlier, and making double the vine, has scarcely bloomed. But with me the crop of peas is secondary, and I prefer the vine, if I only get enough peas to be able to gather seed without too much labor.

Root crops.—We only plant the many articles embraced under the head of root crops, for table use,—therefore in small quantities. The Irish and sweet potatoes being the only exceptions. The Irish potato was better and larger this year, generally, than I ever saw it before. The sweet potato, I think, is not as good as usual; in my own case, and in my neighborhood, it is a poor crop, though I have more planted than usual. We grow usually about 200 bushels per acre, though some planters claim 500 bushels. I have never seen an instance of 500 bushels being produced on an acre.

Our season for the year was one of extremes—very cool in April, so much so that I planted no cotton until the middle of that month. Then, heavy rains, with occasional very dry weather of short duration. June and July, very wet: rainy days, about 20 in each month. Thermometer ranging higher in August than I ever saw before. I have kept a thermometer over 20 years, standing where it now does 10 years, and I never saw it there above 93° until August last, when it rose as high as 98°, and was frequently above 94°.

In consequence of the unfavorable spring, the *fruit* crop was nearly a failure. I have not seen a grown peach on my trees, and I have over 2000. The apple crop is very light, many of them rotting before ripe.

Hoping that such items as I am able to give may prove acceptable to you and your readers, and that thus I may do some little service to the agricultural interest of the country,

I am, with respect, yours, &c.

M. W. PHILIPS.

Woodford County, Kentucky, November 1st, 1850.

Sir:—Viewing the production of sweet potatoes of great importance in the South and West, and believing that they can be produced in many of the Northern States, I have this subject at the head of my report, in order that public attention may be more immediately directed to it. I think that sweet potatoes can be grown wherever the late varieties of Indian corn have have time to mature; at any rate, the experiment is worth the trying on a small scale, and, if successful, they will be a valuable acquisition to Northern agriculturists.

We plant from the 15th May to 15th June, and harvest when the vines are killed by frost—about the middle of September—giving the potatoes from 3 to 4 months to mature in. I have planted the latter part of June with good results. When we commenced cultivating sweet potatoes, it was for some time a hopeless effort, they producing nothing but small, stringy roots, not worth the trouble of raising. At length, when slack-water navigation was opened on the Kentucky River, we received a small supply of *yams* from the South, a potato so far superior to any before seen here, that renewed and successful attempts were made with this variety. Our previous failures had been attributed to soil and climate, as uncongenial to the sweet potato; and it may have been so with the kinds tried before; but with the yam we have been eminently successful, and challenge to produce larger and better potatoes. As a specimen, I will take my crop the present year. I planted only one-fifth of an acre, which produced 28 bushels—at the rate of 140 bushels per acre. The yield would have been greater but for the drought in the spring, in consequence of which at least one-sixth of the plants perished. Six of the largest potatoes weighed 24½ pounds; six next in size, 23 pounds; six next, 21 pounds. The largest potato weighed 5 pounds; and the average, after taking out the seed-potatoes, was about 1½ pounds. There are several varieties of yams: the long red, the long white Spanish, the turnip-shaped, and the largest and best of all, which has a pale yellow skin, and a deep yellow color when cooked.

The soil for sweet potatoes should be light and rich, and the best system of culture, after the ground has been put in good order, is as follows:—In the first place, a broad deep furrow is made by twice running a large plough; the earth is then thrown back in the furrow, by running the plough first on one side and then on the other, until a ridge is formed, say 18 or 20 inches wide at the base; then, with the hoe, it is ridged up to edge. Another row is now commenced, in the same direction as the first. The rows should be 5 feet apart, measuring from the top of the ridges, which should be about 15 inches high. About the 1st of April, the seed-potatoes are put in the hot-bed to sprout. It is the general practice, when the sprouts are say 8 inches long, to draw them from the bed and plant out; but this practice I have abandoned, and adopted another far better, which is, to take the potatoes carefully from the hot-bed, breaking as few roots as possible; then with a knife cut out the sprout with a small piece of the potato attached to it—if it is no larger than a pea, it will be of great importance in keeping the plant from perishing, and will rapidly increase its growth. The sprouts, as they are taken from the parent stock, are carefully laid in a basket, and sprinkled with water, if the weather is warm and dry. In planting, make a hole with the hand on the top of the ridge, about 4 inches deep, insert the plant, and

press the earth to the root. Never wait for a season; but plant when all things are ready, and, if the weather is dry, pour on each plant a pint of water, and repeat the same the next day, if necessary—that is, keep the roots moist until it rains. The common method is to plant 12 inches apart, but I find by experience that, at 18 inches, larger potatoes are produced. After taking off the sprouts that are ready to plant, the potatoes may be put back in the bed, and, if the weather is warm, the sprouts will soon be ready for another planting. As soon as the grass comes up on the ridges it should be scraped off with the hoe, and the loose dirt drawn up to the plants. Before weeding, a small plough should be run between the ridges, taking a part of the base of the ridge, say 3 inches on each side. Afterwards they will require another weeding and dressing, and the tillage is complete.

Irish Potatoes.—Every farmer is so wedded to his own manner of doing things, that it is difficult to divorce him from it. Hence it is that we have no regular system of culture; the principal object is to raise as many potatoes as will serve for family use, and the fertility of our soil always secures us an abundant supply, we having no rot to contend with. We put 6 or 8 bushels of potatoes in a heap, and cover them over, first with straw, and then with 10 or 12 inches of earth, for winter-keeping. On taking them up in the spring, we always find among them young potatoes, from the size of a bullet to that of grape-shot. Observing this led me to *deep planting*, which, during eight years practice, has been attended with success, the size being more uniform and larger than when planted in the ordinary way. Another important matter is, to avoid having too many sprouts in the hill; four sprouts are enough; if more come up, they should be thinned out. I cut my potatoes into small pieces, and, in planting, make furrows 8 or 9 inches and 4 feet apart, put 3 pieces of potato in a place, at 18 inches distance, and cover up deep. They make slow progress in coming up, owing to the exclusion of heat and the distance the sprouts have to grow before reaching the surface; yet they are germinating and forming new potatoes before they come to the light. Chip manure and rotted straw, put in the drills before planting, are the best manure I have yet tried for potatoes.

Cattle and Hogs.—For the want of a market, we are compelled to feed our grain to horses, mules, cattle, and hogs, and thus we realize about 20 cents per bushel for corn, which is a profit of about 100 per cent. on the cost. Our grasses and clover yield about the same profit in live-stock. I think the best method of feeding neat cattle, taking into account the saving in labor, is to feed on the ground with stock corn, that is, corn-fodder and husk, as it is cut and shocked in the field, allowing two hogs to each head of cattle, to feed on the waste, &c. In this way, the expense of houses and sheds, and time in husbanding and hauling manure, is saved. The hogs to be fattened are put in a field of corn, and when it is consumed, they are either put into a fresh field, or corn is husked and carted to them. The field, after the hogs are taken off, is ploughed, and the fertility of the soil by this mode of feeding very much increased. The cost of raising cattle until 3 years old is about $18 per head; the usual price at that age, $24. A good dairy-cow is worth from $24 to $30. A Durham will yield more meat from a given amount of food than the native animal.

Sixty bushels of corn will produce, on an average, 200 lbs. of beef, and 2 hogs (which are allowed to each bullock to feed on the waste) will give 200 lbs. of pork. Supposing 2 bushels of corn to weigh 100 lbs., then 100

lbs. of corn will produce 6⅔ lbs. of beef, and 6⅔ lbs. of pork; or, if 1 lb. of beef is equal to 2 lbs. of pork, 2 bushels of corn will produce 10 lbs. of beef, or 20 lbs. of pork.

The use of hay is so limited that but little attention is paid to meadows. Corn-fodder and oats are a general substitute for hay. Clover is a *sine qua non;* blue grass is next in importance. Without clover we could not raise hogs to advantage, it being as profitable a crop as corn, and, at the same time, fertilizing our exhausted lands so effectually, as in three years not only to double the product of grain, but to fit them for the production of hemp.

Corn.—The yield varies from 35 to 100 bushels per acre; the premium crop of 10 acres, awarded at the late Lexington fair, was 185 bushels per acre: 50 bushels is about the general average. The most esteemed variety is the *large white*, between gourd-seed and flint. The cost of production is estimated as follows:

Interest on 20 acres of land, $50 per acre	$60
Cost of cultivation throughout	80
	140
20 acres, at 50 bushels per acre, 1000 bushels at 14 cents	$140

or 10 cents per bushel, allowing $2 per acre for stock fodder.

We have no regular system of rotation in crops, but usually cultivate hemp land 4 to 6 years, until it will no longer produce the article; then follows a crop of wheat, then clover, until the land is again fit for hemp. We endeavor to manage so as not to grow the same crop two years in succession on the same field.

Curing Bacon and Hams.—It is all-important that hams and shoulders be well pickled, otherwise the bacon cannot be made good by any process of curing. Before hanging, it should have a sufficient quantity of salt to preserve it, and no more; for if made too salt, all the juiciness, high flavor, and relish are destroyed. Salting in bulk does very well if the weather is favorable, neither too warm nor too cold. If very cold, it will take from 4 to 5 weeks to receive sufficient salt; if warm and damp, 2 to 3 weeks will be long enough. After remaining in bulk 1 or 2 weeks, the meat should be taken up, the old salt taken off, and resalted and bulked again. In thus changing the position, the salt is more uniformly diffused. An indication when the meat is sufficiently salt is, that it loses its rigidity, and will yield to a light pressure of the thumb, the hock becoming pliant and wrinkled. To corn hams in brine is the surest method, especially when the climate is very cold. The saltpetre may be put on before salting, or when it is hung up for smoking, using for each ham or shoulder about a tea-spoonful. If they are sugared, the molasses or sugar should be put on before salting. After the salting process is over, the bacon is hung up and suffered to drip 5 or 6 days before drying commences, which is done in the following manner:—Every morning a small fire is made in the middle of the smoke-house, using hickory wood, which is best, and, if the weather is freezing, the fire should be kept up all day, never suffering the meat to freeze. It should only be discontinued on damp, rainy days, when the bacon is dripping. In March the hams are taken down and put in good, thick cotton bags, then rehung and smoked as before, until the weather becomes warm and dry. It takes ¾ of a yard of cotton cloth, sewed up diagonally, to each ham, the hock end foremost, and tied closely at the gammon.

Another method is, after the hams have remained two weeks in salt, to take them out, resalt them, using equal parts of salt and hickory ashes. Sprinkle on the saltpetre, and again put them in bulk for two weeks more, when they are hung up and smoked, after covering the inside of the hams and shoulders with hickory ashes. In either of these methods, the meat should be well sprinkled with Cayenne pepper before salting.

Fruit Culture.—A Remedy for the Yellows on Peach-trees.—The culture of fruit in this section has been much neglected for several reasons—the high price of land, frequent changes in the ownership of landed property, orchards not enhancing the value of land, and, lastly, the spirit of emigration. But the spirit now manifested towards the production of fruits gives assurance that we shall, in a few years, be in the enjoyment of the most delicious fruits our soil and climate are capable of producing. Our farmers know very little about grafting or budding, and are entirely dependent on nurserymen for fruit and ornamental trees. I am indebted to my neighbor, Mr. Christian, for an effectual remedy for what is termed the *yellows* on peach-trees, having tried it for 8 years with complete success. This disease is caused by a grub-worm, about an inch long when full grown, largest at the head and tapering down. It is propagated by a long, slender, dark-colored fly, about the size of a *yellow-jacket*. The eggs are laid at the foot of the tree, in July and August, and, when hatched, the maggot descends and enters between the wood and bark of the roots, on which it feeds, until the leaves turn yellow, and the tree ultimately dies. The remedy or preventive is, to put stable-manure, closely packed, 3 or 4 inches about the trunk of the tree. This should be done in May or June, before the fly lays its eggs. It is a good plan to make small frames of plank, about 6 inches high, to put around the trees and hold the manure, thus keeping it in a compact body. Fresh manure should be applied every spring.

Very respectfully, &c.

BIRD SMITH.

Hon. T. EWBANK, *Commissioner, &c.*

FARMING IN WORCESTER, MASSACHUSETTS.

The Office is indebted to the Hon. John W. Lincoln, of Worcester, for having procured from an excellent practical farmer the following valuable essay:—

Wheat is but little cultivated in Worcester County, nor has it been for many years, as it is considered a very uncertain crop, owing to the blight, or rust, that strikes the straw before the grain has filled.

Many experiments were tried in 1837–8 and 9, to try to reproduce this necessary and useful crop, but I do not recollect of hardly an instance where the experiments succeeded.

Corn.—Indian corn is raised in this county in larger quantities than any other grain. This grain is produced more easily on our light land, and is considered by many to be a profitable crop. On most of this kind of land, from 20 to 50 loads of compost manure are spread on the acre broadcast, instead of being put in the hill, as in former time. The land usually ploughed twice before planting; corn planted in hills, 3 feet apart; seed planted

from the 1st of May to the 15th, and it should be worked out with a horse cultivator between the rows, and hoed each time, the last working to be done before the middle of July; the weeds all to be pulled in August. The average yield on this kind of land is 30 bushels per acre; cost of one-half of the manure taken by the crop, $15; paying carting, spreading manure, cultivating, and hoeing three times, $8; corn fodder against the harvesting, which will well pay. The corn crop, as it is usually cultivated on this kind of land, is not considered a profitable crop, though a remunerating one to a certain extent, as the corn produced in this way, and on this kind of land, will usually pay a reasonable charge for all labor and manure; and, as the manure is not all consumed by the crop of corn, the remainder assists in carrying out a crop of oats and one or two small crops of grass, and then leaves the land in the same low condition it was in before this process was commenced.

Corn is more usually produced in Worcester County, by the grass-growing farmers, for a different purpose than as above described on our more hilly and deeper soils. Corn is considered as one of the very best crops, as the first in a rotation of crops where our best English grasses are to be grown. Much of the land in the county will produce a good crop of hay for from five to eight years, without manure, after a crop of corn and oats, managed in the following manner. After the land has been cropped from six to eight years without manure, it is to be ploughed as soon after the hay harvest is over as may be, so that all the vegetable matter may have the autumn months to decompose in; this ploughing is the better for being shallow, say from three to four inches, as the grass stubble will more readily decompose than when turned under seven inches. In April following, from 40 to 50 loads, of 30 bushels per load, of whole or long manure should be taken from the barn-cellar, (and no farmer should be without one,) and spread evenly on each acre, and ploughed directly under, full seven inches deep. After lying a few days to the sun, this may be worked advantageously with a harrow, when it is in a condition to be planted as before described. Or the same quantity (more is to be preferred) of manure is frequently spread on the grass, about the 10th of May, and then ploughed under full seven inches, the furrows to be rolled with a heavy roller, and harrowed lengthwise of the furrows, and corn planted directly on top of the furrow. In this way, much green grass and stubble as well as manure is carried down to such a depth as will invite the roots of the corn down to where they should go, and the weeds are found much less troublesome than where the manure is near the surface. These furrows are not to be disturbed to their full depth by the plough or cultivator until the last time of hoeing, which is in July, and perhaps not at all, for the corn crop would be better. The majority of our deeply cultivated clay soils will give from 40 to 80 bushels per acre with the above treatment, but the average crop on this kind of land, with the cultivation it usually gets, will not exceed 45 bushels, but leaves the soil in good condition for oats and large grass for from six to nine years.

The most preferable way of feeding this valuable grain, is to grind with the cob, and mix 1 bushel of rye with 2 of corn, and to be used for swine with as many bushels of carrots or other roots, well boiled or steamed, and the meal well mashed in with the boiled roots, and then be permitted to stand 12 hours, with as much salt added as would be used for the like quantity of bread. This feed, in all cases in cold weather, should be fed while moderately warm. Four pounds of this meal, and 3 of roots, will probably

make a pound of pork. The meal will cost one and one-fourth cents per pound, and the roots one-half cent per pound, and pork has averaged 6¼ cents per pound for the last 5 years: any one of our more enterprising farmers would willingly feed swine in any numbers, and cook the food, for the manure. Corn, fed to cattle, is to be ground and fed raw, formerly from 4 to 6 ears twice a day, to a bullock of good size, that was intended for slaughter, for 3 months, on an average, before slaughtering, to be in good condition when put up from the pasture. This meal is used now with more economy on cut hay or straw, at least for milch-cows, horses, and working oxen, especially when the fodder is not of first rate-quality. It has been questioned by some whether it pays the labor for all kinds of stock.

Oats are cultivated on any of our soils that will produce corn, potatoes, or carrots; follow corn best, two bushels per acre on well-tilled land, and more on a poorer soil. Usual time of sowing is in April, or as soon as the land can be worked; later sowed oats will make more straw, but less grain, average crop is 35 bushels per acre. Oats are considered the best feed for road horses, and good for all other stock; they are not considered a great exhauster of the soil, and leave the land in fine condition for clover, which crop usually follows.

Barley has been considered a profitable crop, but for the last 4 or 5 years it has not done well, and has very much gone out of use; average crop in former years was 30 bushels per acre, fed principally to swine; usual time of sowing, from the 1st of May to the 15th of June: it has usually followed corn, and left the land in fine condition for grass.

Rye is cultivated but little, chiefly on worn-out pastures, or for one crop with grass seeds on newly cleaned land; it is considered a great exhauster of land; cultivated exclusively for home consumption, and is used principally as a mixed feed with corn, and is considered equal to corn for swine, when mixed in equal parts; average yield on old pasture land, 12 bushels, new land, 25 bushels per acre: average price in our market, 83 cents per bushel.

Peas and Beans are not cultivated to any extent in the county; field-beans are produced in moderate quantities, for table use, but not for market. Peas are seldom grown out of the kitchen garden.

Clover, timothy, and red-top are sown together, with oats or barley; 12 pounds of clover, one peck of timothy, and half bushel of red-top, per acre, on land of medium quality; more should be used if the land be poor, and less, if in a high condition, for this way clover predominates the first year, and averages from 2 to 3 tons per acre; clover is considered good hay for milch-cows, and young stock; average price, $9 per ton; timothy and red-top prevail the second year, and hold good during the time the field is to grass, which is usually from 6 to 9 years; average per acre, 3000 pounds. These are considered decidedly the best and most profitable grasses cultivated in the county. It is believed there is no crop that pays so well for the labor, and returns so much in way of manure. Average price is $12 per ton at the barn.

Dairy Husbandry.—Considerable attention is paid to this branch of business. Cows for the dairy have been much improved within the last 10 years; many cows may now be found that will produce from 10 to 15 pounds of butter per week, for two or three months, on grass alone; but no farmer has a whole herd of such cows: where we have one such cow, we have six that do not produce more than 9 pounds per week for the same time. One

class of our farmers say in theory, that the Ayrshire or Durhams are the greatest producers; in practice, the other adopts the native, because he happens to have one of them, or a whole herd on his farm, or, more likely, because he has not thought on the subject at all. Our good cows are mostly cows of accident. These things ought not so to be. There are some honorable exceptions, however, among some of our most liberal and intelligent farmers. The Ayrshire stock, in a few instances, being introduced, and, it is believed, though experiments will be carried out, to prove very beneficial to the dairying farmers of the county. The Ayrshire seems well adapted to this part of the country, much more so than the Durhams, and they are destined, ere long, to take the place of any and all other breeds for the dairy.

The North Devons have recently been introduced here, and it is believed that no other cattle can excel them for the yoke, or early beef, but are not considered deep milkers. Great credit is due to the Massachusetts Society for Promoting Agriculture, for the introduction of the Ayrshire and North Devon, a bull and cow of each of these breeds having been presented to our county society from their importation, and there is no doubt but great good will result from their universality. Butter is manufactured in the north part of the county, and milk is produced in the south and east, for the Boston and Providence markets; milk at the farms here is worth, for these markets, 2 cents per quart for eight months, and 3 cents for the remaining four months. Average quantity per cow is 7 quarts per day for 10 months, or about $50 per year; and for butter, 8 quarts of milk for a pound of butter; average price of butter, 20 cents per pound: in either case our cows pay $50 per year; where butter is manufactured, the waste milk for swine or other purposes covers all cost of labor in its manufacture.

It is believed that to manufacture our milk into butter, instead of sending it to market at the above prices, would prove more profitable to the farmers of the county, first, because the waste milk goes far towards growing and fattening swine, and in all cases where suitable help can be obtained at fair prices, or, more fortunately, where the farmer's wife or daughters can personally attend to its manufacture, it is believed that the waste milk very much more than pays for all labor; besides, the economy of feeding swine with this milk causes the farmer to feed double the number of swine that his neighbor does that sends his milk to market; hence the difference in the manure heap. Good cows should be the first object for the dairy. The difference in cows for butter is not generally understood: good keep and cleanliness are indispensable when we want good cows. Milk should be strained in tin pans, and, with the exception of the extreme cold of winter and heat of summer, should be kept on the ground-floor of the house, in a room fitted up expressly for the purpose, well ventilated, and far removed from pig-sty or kitchen; the milk to stand from 24 to 40 hours, according to the weather, the cream taken off into stoneware vessels, and churned while fresh; the process should not be rapid, as the butter does not separate from the milk so well as when from 45 to 60 minutes are occupied in churning. When removed from the churn, the buttermilk should be worked out, and one ounce of the best pulverized rock-salt worked in—should stand 24 hours, and then all the buttermilk should be worked out, and lumped or packed in stone pots, where it may be kept for 8 or 12 months. Butter of this description is worth, on an average, 23 cents, while butter from the

same cream, that is manufactured in a careless way, say where 2 oz. of salt are used, and 2 oz. of buttermilk are left in, will bring but 17 cents, and is worth but 14; hence the difference: the one that produces the good from the same materials, realizes from each cow his $60 per year, when his neighbor, that makes the poor, gets but $40; and all this difference in merely working and salting the article.

Neat Cattle.—Fifty per cent. of all our cattle are raised in the county, and the other half are driven in principally from Vermont, Maine, and New Hampshire. This foreign stock is purchased late in autumn, principally for the purpose of consuming the poorer sorts of fodder, and to be grazed in summer, and used to supply our markets with early beef. The best farmers select their best calves for raising: the usual way has been to take them from the cow at 3 days old, and teach them to drink milk; new milk is given until 4 weeks old, and skimmed milk continued until 10 or 12 weeks, when they are turned out to pasture, which practice is considered more judicious than to let them have a run with the cow, as it is considered injurious to the cow to be teased by them for so long a time, and not so well for the calf. Heifers are not permitted to come in until about 3 years old; steers are broken to the yoke at 2 and 3 years old; cost of keeping to this age is $25. Steers and heifers that are raised in this way are always in demand, and sell, for the yoke or dairy, 25 per cent. higher than foreign, or those from other States. Steers, well broken to the yoke at 3 years old, if well matched, sell for from $75 to $100. Heifers, at this age, with a calf at their side, sell for from $30 to $40, such as are raised at home, and those from other States for 25 per cent. less. Our Agricultural Society have offered large premiums for all kinds of stock raised in the county, which has stimulated our farmers to select the very best calves from the best cows for the dairy and the yoke. Much attention has been paid to the training of oxen for all purposes of agriculture, especially for the plough and cart, and it is believed that more well-matched and well-trained oxen are to be found in Worcester County than in any other section of the country.

The question is asked, which will yield the greatest amount of meat from a given amount of food—the Durham, Devon, or Hereford? The Durham is considered too large for profitable feeding; a cross with our native is preferred, as the animal matures one year earlier than the full-blood Durham. The beef of the half-blood is as well marbled at 4 years old as in the full-blood at 5, and it is considered more profitable with us to feed the grade than full-blood. Young cattle, from 2 to 4 years old, that are in good condition the first of May, are turned into our sweet pastures, and are fit for our markets in August, before the western and northern beef comes in, pay much better than larger and older cattle that depend on winter-stalling and consume much grain, which is quite too costly for this section, and the beef is worth but little more per pound than the grass-fed, which goes into market early. The North Devons have but recently been introduced into the county. Two animals of this breed, a male and female, were presented to the Worcester County Agricultural Society by the Massachusetts Society for the Promotion of Agriculture. These animals are of pure blood, from the importation of the Massachusetts society in 1846, and it may fairly be presumed that the experiment of a cross with our natives will greatly improve our stock, at least for the yoke and grazing. No pure-blood Herefords have as yet been brought into the county.

Sheep are not kept, to any extent, nor have they been for the last twenty

years. Small flocks of the middle-wool sheep are kept, for producing early lambs for the June and July markets. Lambs fit for market at this season sell for from $2 to $3, and are considered profitable by those who have conveniences for keeping sheep.

Hogs.—25 per cent. less of hogs are now kept than ten years ago. Hogs are not considered profitable, as the grain raised on the farm is wanted for feeding to cows, to supply our markets with milk, and consequently we do not have the wash of the dairy, as in former times, which greatly aided in feeding our swine, and increasing our manure heaps.

The Suffolk, crossed with our best native, is considered the best for all purposes. Some inquiries are being made, to know if pork cannot be made without a loss on corn brought into our markets from the South and West, and which usually costs at our door 1⅜ of a cent for good; strong shoats usually cost, the first of May, 5 cents per pound. Fresh pork is worth, on an average, 6¼ cents per pound the first of October; shoats bought the first of May, weighing 100 pounds, will consume 5 pounds of corn-meal per day for 5 months, and, if well cared for, will gain, on the above feed, 1⅛ of a pound per day. From each hog, if properly managed, one cord of good manure can be made, which, in our market, is worth $4; this should go against all work for tending.

Best method of curing bacon and hams, put two quarts of butter-salt into an iron kettle, and place it over a slow fire, and stir it occasionally, so that it does not bake in the kettle; and while the salt is dissolving, the ham should be placed on a strong bench near the fire, and a common-sized tea-spoonful of saltpetre to be rubbed smoothly with the hand on the flesh-side of the ham; it will soon dissolve and disappear. The salt in the kettle is now hot; lay a table-spoonful on the ham, and rub it with the hand; continue to apply the salt to all parts of the ham until the ham *sweats*, which is an indication that the salt has penetrated through the ham. The above quantity of saltpetre is for a ham of 20 lbs.; a ham of this weight may be cured in 10 minutes; the ham may be thus treated before the animal heat is entirely out, and it is fit for the smoke-house, where it will be ready for use in 10 days, or it may remain with perfect safety for a year, or longer, before being used; the smoke-house is the safest place for keeping. Any lover of good ham, after trying this method, will be satisfied that it is the best method; certainly for family use, as it can be kept the year through.

Hemp is not cultivated, nor has it been for the last 25 years.

Root Crops.—Seventy-five per cent. more of turnips, carrots, and beets are now grown than 10 years ago.

Turnips.—The round flat for field culture have, in former years, been cultivated with our corn crop—1 pound of seed per acre is sown broadcast at the last dressing or hoeing of corn, which usually takes place the first part of July. No other attention or labor is required until harvest: from 100 to 200 bushels are gathered in this way. More recently, waste lands are broken up for the purpose of reseeding, and permitted to be summer-tilled without any other crop, until the last of June, and, at any time before the 1st of August, to be well manured, and seed as above sown and covered with a bush-harrow: from 300 to 500 bushels have been harvested in this way. This crop is not considered a great exhauster, and is worth, for stock to consume at home, 12½ cents per bushel, fed principally to dry stock, while

consuming the poor fodder. Seed should be imported from England or Scotland once in 3 years at least.

Carrots are grown in any kind of land that is favorable for corn—a deep, mellow loam is preferred. The land should have been used 1 year, at least, for corn or some other like crop, until the sod is completely rotted, and then manured liberally and ploughed to the depth of 10 or 12 inches; and if subsoiled, all the better: this should be done as early as the ground and weather will permit, generally as soon as the 1st of May. The ground should be deeply and thoroughly ploughed once or twice a week up to the time of sowing the seed; the land, as soon as in condition to take the seed, should be levelled with a bush-harrow, and 1 pound of seed to the acre is sown in drills with a common seed-sower, 15 inches apart. The wheel of this seed-sower shows the time on which the seed is dropped, and a light hoe should be passed between the rows before the young plant makes its appearance; by this process, the weeds are kept back and the land kept light; weeds in no case should be permitted to get the start of the plant. The hoeing and weeding should all be done while the sun shines. From 500 to 1000 bushels per acre have been produced, and this valuable crop is coming much into favor with our farmers. Ten dollars per ton is considered a fair price; feed principally to horses, milch-cows, and, more recently, to hogs. Carrots have been raised for several consecutive years on the same land, and apparently with better success than the first or second year.

The *mangold wurtzel* and *sugar-beet* have been cultivated for quite a number of years with considerable success: from 700 to 900 bushels to the acre have been raised; the land to be treated the same as for carrots. Worth from 17 to 20 cents; fed principally to milch-cows; 25 per cent. less of these roots have been raised for the last two years, on account of a blast that has struck the leaf before the root had matured.

Irish Potatoes.—Fifty per cent. less of this once valuable tuber was secured the present season; the vines looked remarkably well until about the 8th day of September, at which time we had a heavy fall of rain, and immediately after this, the vines had the same appearance that they usually do after a heavy frost; and, at harvest-time, the vines had nearly disappeared by decay, and nearly one-half of the potatoes were in a decayed state, and this decay has continued after housing, so that, at this time, 25 per cent. of what were saved at harvest-time are now lost.

Fruit culture is receiving increased attention in our county; young orchards of the most approved kind, principally winter fruit, are being planted out in large numbers, and much care and attention are now being paid to grafting all of the more hardy trees that have produced less valuable fruit. The Baldwin apple is receiving the most attention, and next the Rhode Island Greening; the Golden Russet and Roxbury Russet are considered the best varieties for market. High land, with a clay subsoil and a gradual descent to the east or north-west, is to be preferred; before setting out the trees the land should have been cultivated with corn or some other hoed crop, for at least one year. The young trees should be at least of 5 years' growth from the bud, straight and thrifty, and set not less than 35 feet distant in straight rows; the holes should be dug of a circular form, not less than from 6 to 8 feet in diameter, and 18 inches deep. Fine dry topsoil should be used to fill the hole; the roots of the tree to be nicely arranged and brought out in straight lines; from 1 to 2 bushels of bones may be used in filling the hole; whole ones are to be preferred, or at least they should

not be ground very fine, as the glutinous and limy qualities of the bone would be taken up too rapidly by the young tree; care should be taken that the tree should stand as near the surface as it can with safety; no staking or propping should be used; early in November earth should be placed about the trunk of the tree, which tends greatly to keep it in place during the winter months, and should be removed not before the 1st of May, which will prevent the buds from putting out too early.

The land to be kept in constant cultivation by some hoed crop for at least 12 years, or until the tree comes into full bearing. After this, no crop should be suffered to be taken from the land, except the product of the trees. The land must be kept light and free from weeds, either by the plough and cultivator, or by young pigs being confined in the lot during the summer and autumn months up to harvest-time. The latter practice is to be preferred, as all the apples that fall prematurely are taken up as fast as they drop by the pigs; and by this means all the worms, as they fall in the apple, are destroyed. All the worthless apples should be gathered up each day as they fall, to the 20th of September, or until harvest-time, so that no opportunity is left for slugs or worms to make deposits for future time. The unnecessary limbs should be removed several times in each year after the first, the process to commence the 1st of June, and no pruning after the middle of August: the young limbs to be removed, while small, with a sharp pocket-knife. Great care should be taken not to graze or loosen the bark. No one, on any account, should be permitted to step on or into the limbs while pruning or harvesting; care should be taken that not too much nor too little of the top or branches should be taken out at once: if too much, the sun strikes the trunk too hard; if not enough, the useless limbs take too much sap from the trunk. Great care should be taken that the tree does not limb out too low: the lower limbs should be at least high enough to permit a horse to pass under freely, without interfering with the limbs. If the limbs should incline down too much, one or two crops of corn may be grown on the land instead of roots, while the trees are yet young, which crop will cause the young shoots to go up, and by this process the top can and should be made very beautiful, and the better calculated to hold its fruit.

Winter fruit in this section is harvested from the 20th of September to the 10th of October, to be picked from the tree by hand and placed in flour-barrels, the barrels immediately headed up, and to be placed in a cool, dry situation for the first month, and then removed to the cellar or carried to market.

Average price for the Baldwin and other best kinds of winter fruit at our nearest market is $1.75 per barrel; fall apples, 33 cents per bushel. It is believed orchards cared for as above described pay a good interest, while trees scattered here and there in grass land, all over the farm, are worse than nothing. Some attention is being given to growing winter sweet apples. The Danvers Sweeting and Honey Greening keep well through the winter. The Lady Sweeting has but recently been introduced—is said to be a profitable apple.

Apples have not been used for feeding to cattle, but in a limited way. No experiments have been tried with milch-cows or other stock. It is believed that sweet apples will prove very valuable for milch-cows. They have been fed to some extent to hogs, both raw and cooked. Cider for drink has come into disuse, and refuse apples are used for swine, cooked and used with meal. Considerable attention is being paid to setting out peach

orchards, and it is thought that peaches of quite as good flavour are produced here as further south. The early crop pays well, while the late crops are not worth cultivating. It is believed the market will be overdone with what trees are already set.

The pear has attracted some attention; orchards of this kind of fruit are now being set, and a countless number of varieties are being experimented on; with what success, after-time must show.

Our native grapes have been greatly improved within a few years, in quantity and quality, by being transplanted from their native forest to the garden and well-cultivated field. Many varieties of the foreign grapes are cultivated (mostly for home use) both in open fields and under glass; bones are considered the best substance that can be used as a manure.

Quinces flourish, perhaps, as well here as in any other section of the country, and have been considered profitable for the market; average price $1.50 per bushel.

Manure.—Fifty per cent. more manure is made and preserved for use now than 10 years ago. Barns are now built with cellars under them. The most convenient plan is to set the barn on a slope or side-hill—facing to the south is to be desired; the cellar to be walled on three sides and open on the other; 9 feet deep, if the land is dry on which the barn is to be set; the floor of the barn should run lengthwise, with stalls for cattle on one side and a deposit for hay on the other: in this way, the droppings of the stock are let down through scuttles into the cellar. In this way, the liquids as well as the solids are all preserved, and held fast until wanted for use. If the land is light and dry where the manure is to be applied, muck or swamp-mud if wet and heavy, loam or sand should be used, and all the waste hay and straw and other vegetable matter that can be collected should be deposited in this cellar, and the whole mass to be composted and worked over when the weather is too wet for out-door labor. The cattle to be kept in the stall all but a short time in the middle of the day in winter, and the cows to stand in over night the year round. Plaster should be sprinkled on the floor each day, and permitted to mingle with the manure below. The manure may be forked over as often as convenient during summer, and perhaps small quantities of lime may be used to advantage, to help decomposition. If the cellar does not get too much filled up, this whole mass should remain in the cellar until a convenient time for using—September is preferred. The cellar is then to be cleaned out and the manure to be ploughed immediately in, to prevent evaporation, where it may remain until the following spring. Hogs are frequently wintered on the compost, and, if properly cared for, will do well and thrive, besides doing much of the labor of mixing these several ingredients.

It is thought that from 37 to 50 per cent. is saved in this way in manure and labor, besides having much spare room for storing roots and housing farming-tools.

So much is thought of the above method of preserving manure from waste by evaporation and wet, that the most of our more thinking farmers are digging cellars under their old barns, rather than be without them.

Plaster is used 50 per cent. less than in former years.

Lime is used but in small quantities for agricultural purposes, as the cost in our markets is quite too high.

Guano has never been used in any great quantity, nor will it be until its market value is lower, and the different quantities are better understood by

our common farmers. Guano may yet successfully compete with other manures; much every way may be done by our national government in securing and preserving the trade in this valuable article.

It is confidently hoped that the Agricultural Bureau, at Washington, will seasonably look to this matter.

Sutton, February 7th, 1851. HARVEY DODGE.

Hon. THOMAS EWBANK,
Commissioner of Patents.

South Union, Kentucky, December 28th, 1850.

Sir:—Below you will find such answers to the inquiries from the Patent Office, on the sheep husbandry of this district, as our limited means for information will permit us to give. Answer 1st. The prevailing breed of sheep in this district is the common native, with the exception of some of the best flocks, which have crosses of the Merino, Saxon, Cotswold, and South-down breeds, with some thorough-bred.

2d. Two pounds per head of clean-scoured wool, ready for the manufacturer, are about the usual clip. The Cotswold and their crosses will yield from 4 to 10 pounds suitable for the comb.

3d. The sheep in this district of country are generally healthy and productive in young, the number of lambs being nearly or quite equal to the ewes, though, from the practice of unrestrained intercourse between the sexes and the want of shelter, from 25 to 50 per cent. of the lambs is usually lost during the months of January and February; but it is our practice to keep the bucks from the ewes until about the 20th of October, or 1st of November, so as to have the lambs come in the months of March and April, at which time the ewes can get something green to feed upon—consequently the lambs are more healthy.

4th. Hunger is to be far more dreaded among the native sheep of this region, than all the other diseases combined, excepting the devouring jaws of the dogs. Blooded sheep are not so healthy, the lambs being carried off during the months of August, September, and October, at the rate of from 10 to 50 per cent. by a lingering disease, known probably in the books by the name of pines.

5th. I cannot say the number of sheep is increasing in this district faster than the number of inhabitants—though they may be.

6th. Small farmers make no surplus wool—larger ones dispose of their surplus to the mechanical and non-producing class.

7th. From 50 to 60 cents per head, varying with the different range of neighborhoods, may perhaps be a fair estimate of the cost of keep in this district.

8th. The usual time of foddering is from the latter part of November until some time in March.

9th. The summer feed for sheep is in the wild range of the woods, consisting principally of grass and herbage, in great variety and abundance, of which some flocks get more or less the year round.

10th. Sheep are fed in this section during the winter on corn-fodder, hay, and sheaf-oats, with the addition in severe cold weather of Indian corn. Our flock of sheep, consisting of about 600, will average about 3 pounds

of clean-scoured wool per head, about one half of which is of the Saxon and Merino breeds; the other half, Cotswold, Bakewell, and Southdown crosses on select native sheep. The staple we consider good, and, if the sheep have proper treatment, it is, perhaps, equal to any in the United States. The Saxon and Merino fleece is worth about 30 cents per pound in the dirt, which loses about one-half in scouring. Other kinds vary in price according to grades, and will bring from 30 to 40 cents per pound when scoured.

Your friend,

URBAN E. JOHNS.

Hon. FINIS E. MCLEAN,
Washington, D. C.

Great Crossings, Scott County, Kentucky, December 26th, 1850.

Sir:—I have just received your circular, and, as I highly prize the Patent Office Report, will attempt to give you some information upon the desired points, so far as I am able.

Wheat.—Several varieties are used in this neighborhood; the Missouri white, which is ten days earlier than any other, Illinois velvet-chaff, red-chaff, bearded, and Mediterranean. The Missouri white is moderately productive, and makes very fine flour. The Illinois velvet-chaff is a fine, heavy wheat, weighing, in good seasons, 65 pounds per bushel, yielding well, and makes a good article of flour. The Mediterranean is coming into general use; the flour is not so white as some other, and it is not so liable to rust; bears heavy grazing, and yields a fair crop. Average crop on our good lands, about 15 bushels per acre. Time of seeding, from 15th September to 15th October, and of harvest, from 20th June to 10th July. We sow from 4 to 5 pecks to the acre, and without any preparation of seed. Our wheat is generally sown after corn or clover, no regular rotation of crops having been adopted. We cut up and shock the corn, then plough the ground perhaps 3 inches deep, sow the wheat, then harrow, and the work is done. Some sow and plough it in, and do nothing more. Where wheat follows clover, the object is to enrich the land; hence the second crop of clover is allowed to grow, and is then turned under, thus affording a good coat of manure; the wheat is sown on the furrow, harrowed in, and left to grow. We have not been troubled with the Hessian-fly for a number of years, owing, I suppose, to late sowing, which was adopted when they were troublesome.

In order to avoid the white weevil, we get out our grain as soon after harvest as possible, and put it in rail-pens in the chaff, and cover well with straw, which is a certain remedy. Average price per bushel, about 60 cents.

Corn.—This is our great crop. Varieties, the Craig cone-gourd-seed, white flint, and yellow flint. The gourd-seed is supposed to shell the most, while the flint is thought to be the most nourishing. Average produce per acre, 40 to 50 bushels; cost of production, 15 to 20 cents. While the usual yield is as above, still, on highly manured land, an almost incredible yield has been obtained—150 to 175 bushels have been reported. Our lands have been so productive, and our farming operations of such a character, that no effort has been made to ascertain the best system of culture. But

a brighter day is dawning. Western farmers are becoming interested in so arranging their operations as to make the least number of acres yield the greatest number of bushels. Sufficient importance has never yet been attached to preparing the soil. We have generally ploughed our ground only two or three inches deep, then (if for corn) it was laid 4½ feet each way, and planted; but we now have better ploughs than formerly, and plough deeper, and plant our corn nearer, say 4 feet by 2, which is better than the old fashion. I now grind all my corn with the cob, that I feed. I intend to make some experiments with regard to feeding raw and cooked food, and, when I do, will forward you the result. For feeding corn to horses, mules, and cattle, I am fully satisfied that there would be a saving of at least 25 per cent. by grinding it.

Manures.—We rely mostly on small grain (wheat, rye, oats, and clover) for manures: we however occasionally haul the accumulated piles from the stables and barnyards, and scatter on the fields. The usual mode of resuscitating worn-out land, is to sow down with clover, about 6 pounds to the acre, and let it remain three or four years, pasturing it during the summer, and in winter feeding our cattle with the shocked corn or fodder; thus keeping the manure of the cattle, as well as that made by the waste cornstalks, on the ground. In this way, the produce of one field is removed to another, which keeps the land in good heart. I do not know a single farmer who shelters his manure heaps, or attempts to increase the quantity by adding muck, leaves, straw, or any thing else. That made in the usual course of farming, is on rainy days thrown out of the stables, there to remain till some convenient time arrives for drawing it away. All our level lands in Scott, Woodford, Jessamine, Fayette, and Bourbon counties, are capable of producing, when properly managed, 100 bushels of corn to the acre; and the time will come, in my opinion, (if the Union of these States is maintained,) when that will be the average.

Oats were formerly regarded as a very exhausting crop, and not much cultivated; but their excellence as an article of food for horses and mules was not understood. They now occupy a prominent place in every good farmer's rotation. Average yield per acre, 40 to 50 bushels; quantity sown, 1½ bushels per acre. *Barley.*—None raised in this county. Rye was extensively cultivated a few years since, and was highly esteemed as an article of food for horses; it was also esteemed for the fine pasturage it afforded for young stock in fall and spring, but it has become an uncertain crop, and is not much grown. Average yield per acre, 20 to 25 bushels; quantity sown per acre, 5 pecks. Beans and peans not cultivated here. Clover is seldom used in any other way than as a fertilizer, and, if not pastured, is left on the ground to act as a manure. Timothy is the meadow grass of this region. Mode of culture:—The soil is well prepared in August or September, and the seed sown by itself, when we wish to mow the next season. Sometimes it is sown with wheat and rye, or, in the spring, with oats, or on rye and wheat in February and March. Average crop, about 1½ tons per acre. Leached ashes is considered the best manure for timothy.

Butter and Cheese.—The price of butter is from 10 to 20 cents per pound, according to the season. No cheese is made, worth reporting.

Neat Cattle.—I suppose the cost of rearing until 3 years old, to be $15 to $17.50 per head, and the average price about $20 per head. Value of good dairy-cows in spring, from $30 to $50; and in fall, $20 to $30 each. I have no means of ascertaining how many pounds of beef 100 pounds of

corn will produce. I believe the general calculation is to feed 50 bushels of corn to the steer during the winter, and that a fair gain is 150 pounds to the bullock. The short-horned Durhams are the favorites in this region; there is not a herd to be found which is not crossed with the Durhams. The Devons and Herefords have not been introduced here.

Sheep.—Some attention has been paid to them. Southdown, Bakewell, Merino, Saxon, and Cotswold, have, at different times, claimed attention. The Cotswold is now the favorite, the coarse wool being generally preferred for the manufacture of jeans and linseys. The Southdowns are the best for mutton, and a cross of the Cotswold upon the Southdown produces a fine carcass, good mutton, and a fair yield of wool. My own opinion is, that upon our lands, that cost from $50 to $60 per acre, wool-growing is not profitable. I think that 6 lbs. wool in the grease (worth 25 cents per lb.) is above the average per head for our flocks to yield, and that would pay only 10 cents per month for keeping. I suppose the number of lambs raised annually to be about ¾ that of the ewes.

Hogs.—The best breed, Woburn crossed with the common hog. They are long and deep, and fatten easily. I am clearly of the opinion that the cheapest way of making pork is to keep hogs always fat, which may be done with a little attention. I suppose 100 lbs. of corn, fed raw, would yield about 20 lbs. pork.

Hemp is next to corn in this part of Kentucky, as a crop; its culture is on the increase. It is a crop that requires good cultivation in order to obtain a good yield. The soil must be well pulverized by ploughing and harrowing before sowing the seed. Average yield, about 6 cwt. per acre. Cost of production, about 3½ cents per pound.

Root Crops.—None raised.

Potatoes.—Irish and sweet are all planted for home consumption. Owing to the peculiarity of the season past, there was almost a failure. Irish potatoes are worth $1 to $1.25 per bushel; the usual price at this season being about 40 cents.

The cultivation of fruit in this neighborhood has received but little attention. The old settlers planted a few seedlings, and turned their attention to farming, and, as the next generation came up, they were satisfied with what their fathers had done in this way; but a "better day is coming." A number of young orchards of good fruit are just coming into bearing. Some of the varieties are Pryor's Red, Jennett, June apple, Bell-flower, Holland Pippin, Newtown Pippin, Northern Spy, Roxbury Russet, Summer Pearmain, Minister, Emperor Alexander, &c. A large number of orchards have just been planted, and there are not trees enough here to supply the demand. Increased attention is paid to the character of the fruit, as well as to the quantity, and we hope to be able, in a few years, to show some good fruit. There is a decided interest, as well as improvement, in the smaller fruit, such as cherries, raspberries, strawberries, gooseberries, currants, &c. Pippins and other good-keeping apples are worth 16⅔ cents per bushel on the tree. Peaches are cultivated to a considerable extent, but the ravages of the worm at the root of the tree, causing early decay, almost discourage our efforts to raise them.

Permit me to say, in closing, that I am so fond of agricultural pursuits, that I introduced a resolution before the board of trustees of Georgetown College, for the appointment of a committee to inquire into the expediency of attaching an agricultural department to that institution. What are

termed the learned professions, are full, and the people begin at last to think that some learning is essential for a man to make of himself a successful agriculturist. I trust that in the wide-spread diffusion of useful knowledge, obtained through the agency of your office, an impulse will be given to the subject that will not be allayed till our fields shall be brought to the highest state of fertility, and until, in every county, associations of intelligent farmers are formed, for the better promotion of the science of agriculture.

Respectfully yours,

Y. R. PITTS.

Victor, Ontario County, N. Y., December 13, 1850.

Sir:—Among many other cultivators of the soil, I have received a circular from the Patent Office, soliciting information upon various points of agriculture, which I shall undertake to answer in the same order that they are found in that document.

Wheat.—Varieties in use, Soule, flint, and the Hutchinson; average, 25 bushels per acre; time of seeding, from the 10th to the 20th September; time of harvesting, from the 10th to the 30th July; preparation of seed—the only usual preparation, is to clear it of all foul seeds and sow it dry; we sow 1½ bushels to the acre; we plough three times, or once, and use the two-wheel cultivator; we plough from 7 to 10 inches deep; the yield per acre is increasing. Our most approved rotation is to sow wheat every third year, and seed with the large red clover each time; the intermediate seasons between the wheat crops, we mow the clover for hay, or use it for pasture. The best remedy for the Hessian-fly is to keep the land rich, and not exhaust it with spring crops, nor sow wheat oftener than once in three years; prepare the land first-rate, sow, in proper season, a moderate quantity of seed, and give it room to produce a large, rank, and vigorous stalk; upon such stalks of wheat the flies can do little or no injury; on the contrary, I have noticed that wheat sown too early in the season, or too late, or upon a poor, half-tilled, half-manured soil, and after spring crops, and where too much seed, by half, is used, would generally have a sickly appearance, a soft and tender leaf and stalk, most easily perforated, and altogether, it turned out to be just the wheat for the Hessian-fly to riot in. We have received about $1.13 this season per bushel.

Corn.—The most esteemed varieties are the Dutton, the eight-rowed yellow, and eight-rowed white. We get, on an average, 40 bushels per acre; cost of production, 8 cents per bushel, exclusive of land-rent. Best system of culture:—Plough the land early in May, harrow it fine; mark for rows, both ways, 3½ feet apart; plant from 5 to 7 grains in each hill; as soon as the corn is fairly up, plaster it with gypsum, ashes, and lime; in a week afterwards, go through with the shovel-plough or one-horse cultivator, two furrows in a row, each way; let a hand follow with a hoe, to uncover the hills that get covered with the plough. At this time it should be examined, and all over four stalks in a hill should be cut out. Corn should be ploughed at least three times, and well ploughed. If land is well broken up in the spring, and well harrowed, the rows run straight, the work of dressing corn can mostly be done with the plough. It is sometimes useful to grind corn for hogs; it would be useless to grind soft corn, but dry

hard corn ought to be ground, and, under some circumstances, it is thought to pay well for cooking it; for instance, where animals have been fed a long time, and are pretty fat, then it will do to cook their meal. If the manure made from 20 bushels of corn be well applied, I think it will increase the yield at least 10 bushels.

Oats.—We sow 2 bushels to the acre, and get a yield of 40 bushels.

Barley.—We sow 2 bushels, and an average crop is 30 bushels per acre.

Peas.—I sow 3 bushels per acre, and get about 20.

Beans.—We sow beans in drills 2½ feet apart; 20 quarts is the usual quantity per acre; an average crop is 20 bushels.

Rye.—Those who sow this grain, sow 1½ bushels per acre; they get, on average, 15 bushels per acre. Peas are the least exhausting crop, and are not sown as a renovating crop.

Clover and Grasses.—1½ tons per acre is an average yield. The best fertilizers for meadows are plaster and stable manure. The grass seeds for meadows are red-top, timothy, and clover; we sow from 6 to 8 quarts per acre. The cost of growing, cutting, and stacking hay, including seed and plaster, is $2.50 per ton.

Dairy Husbandry.—In this vicinity, it is thought that cows will produce 150 lbs. of butter per year. It costs about twice as much to make butter as it does cheese. Milk, for butter, is treated something in this way:—It is strained into tin pans about 4 inches deep, and set in a place of the right temperature, where it stands until the cream rises, when it is immediately skimmed, not waiting for the milk to sour, for it is thought that the acidity of the milk destroys or neutralizes a portion of the cream. The cream is churned in the usual way, by agitating it in the churn, keeping it in a place of the right temperature. The point is not yet settled among good butter-makers, whether it is better to churn the milk with the cream, or the cream only; but one thing they all agree in—that is, that the pails, pans, and all articles used about milk should be kept entirely clean. Butter, after it is churned, should be thoroughly worked, to get out all the milk; if this part of the business is not well done, it soon becomes soft and rancid, and is unfit for market. Cows, for making butter, should be kept in good condition, with plenty of green food, be salted often, have plenty of water, and have shade in hot weather, and a good, warm stable in winter, with plenty of roots and other feed. All these things are requisite, both as regards the quality and quantity of butter. The average price of butter has been about 13 cents per pound; for the last season, cheese has brought 6¼ cents.

Neat Cattle.—It costs, at the usual rate charged, $30 to rear a heifer or a steer till three years old. The usual price at that age is $25 for a heifer, and $30 for a steer. The value of a good dairy-cow in the spring is $30, and $25 in the fall. A given amount of food will yield no more meat in a Durham, Devon, or Hereford, than in a native animal, if they are in every other respect equal.

Sheep and Wool.—The growing of wool is not profitable in a grain-growing country. It costs, at the usual rate charged for keeping sheep, 50 cents a pound to grow fine wool, and 45 cents a pound for coarse wool. A ton of hay is worth $7, and will winter 8 sheep, that will shear 28 pounds of wool. It costs 5 cents per pound more to grow fine Saxon or Merino, than it does coarse wool. The proportion of lambs reared is 8 to 10 ewes.

Hogs.—The best breeds are the Berkshire, Leicestershire, and Byfield. The cheapest way to produce pork is to keep just hogs enough to eat all the sour milk, small potatoes, and "bits o' bread," that may be produced upon the farm. Hogs, if allowed to run in the orchard, can be kept pretty cheap until they are 15 or 18 months old, when they will have usually got their growth, and will fatten easily upon corn, peas, or barley. One hundred pounds of corn, upon the closest calculation that I can make, will make 25 pounds of pork. Hogs should be killed in cool weather, and, after dressing, should hang till quite cold: otherwise the meat will have a strong, disagreeable taste. Pork for pickling should be cut in small pieces, the bloody parts well washed: the best rock or solar salt should be used. It should not be packed very tight, for the brine should flow through in liberal quantities: if not, the pork will have a greenish and bloody appearance. When it is packed down in large pieces, it is apt to taint before the brine strikes through. Casks that have ever contained sour brine should not be used again, for they are sure to "leaven the whole lump." Hams should be salted down a few weeks in brine made of common salt, saltpetre, and molasses: they should be smoked pretty thoroughly—when they are fit for market.

Cotton, *sugar-cane*, *tobacco*, and *rice* are not raised in this part of the country.

Carrots, *Beets*, *and Turnips.*—The cultivation of these roots is not on the increase. Land for these should be manured pretty heavily; it should be warm, sandy, or gravelly; it should be ploughed deep and subsoiled; it should be harrowed fine and laid into ridges two feet apart, and four or five inches high; they should be made true with an implement made for that purpose. Carrot-seed should be sown as early as the land can be prepared; it should be soaked till near sprouting before being sowed; it may be sown with a hand-drill running on the ridge; if they are carefully sown in straight rows upon ridges, the after-culture is greatly facilitated. I have a shovel-plough with a share made for the purpose, that cuts about 8 inches wide. By planting thus, I am enabled to plough with a gentle horse very close to the rows; the roots in the rows may stand two or three inches apart. This plan has some advantages over the old plan of doing all the labor with the hoe and the hands; it loosens the earth deeper, and enables the roots to send out their lateral fibres to a greater distance, which improves them very much, both in size and quantity per acre, and, more than all, it saves two-thirds the labor. Carrots yield, on an average, 600 or 700 bushels to the acre; beets, 350; and turnips, 250. For fattening animals, these roots should be boiled, but for milch-cows, or working cattle and horses, they are better in a raw state; but in all cases they should be washed clean before feeding.

Potatoes.—Average yield, 150 bushels per acre; cost of raising, 10 cents per bushel; the most prolific are the Rohan and Merinos; the most profitable are the early June, pink-eyes, and kidneys. The best system of planting, in order to escape the blight, is to select a piece of dry, sandy, or gravelly land; manure and plough it as early as possible; harrow it fine, and mark for rows 3 feet each way; plant the earliest varieties, put two potatoes of medium size in each hill; as soon as they are a few inches out of the ground, plough them both ways, two furrows in the row; hill them lightly with the hoe. Three times ploughing and hoeing are enough, if well performed.

The cultivation of fruit is receiving increased attention. From 500 to

800 bushels of apples can be produced on an acre; there have been large quantities shipped from this place this fall. Good winter fruit has been selling at from 75 cents to $2.50 per barrel of 2½ bushels, so that it is easy to estimate the product of an acre at from $100 to $200. The difference between apples and potatoes for feeding is about 30 per cent. in favor of potatoes. The best varieties for keeping, are the Northern Spy, Roxbury Russet, Spitzenburg, Greening, and Newtown Pippin. These are best also for exportation.

I think I know a preventive for the blight in pear and apple-trees. I have examined the subject carefully, and think I have traced the cause to the unsuitable nature of the soil upon which they are planted. I have examined pear-trees, with reference to this disease, in at least one hundred and fifty different localities, and have invariably found, that when they are planted on a rich, deep, loose soil, at the foot of a cultivated hill, they live to a great age, and bear heavy crops of fruit annually. On such soils they are healthy and free from blight. The soil for pear-trees should be at least 4 feet deep, as its roots are long, and almost fibreless. It is a rapid grower, and requires a great deal of nourishment, so that, upon a poor, thin soil, it soon becomes weak, like a straw-fed animal, and dies of the blight. The black ash, a native of low, rich soils, when removed to high, light soil, is subject to the same disease. I have never seen a pear-tree standing on the top of a dry, sandy hill, that was ten years old and free from blight, nor upon a thin soil of any kind.

It takes a long time to get them in bearing; so the land should be cultivated while the trees are young. Corn, potatoes, or other roots are preferable to grain. I have about two acres of apple orchard, and consider it the most profitable of any crop I raise. It will average fifty dollars per acre. My orchard is grafted with russets, which are the best for keeping, and will not injure by freezing so soon as other kinds. They are not so good on wet land as the Baldwin.

Currants are easily raised, and never fail; they make excellent wine, with very little labor. Moist land is the best for them.

Yours, most respectfully,

MOSES FRENCH.

Barbour County, Alabama, November 9th, 1850.

Dear Sir:—In making out a report in reply to your circular, I have endeavored to collect the most reliable information, derived from observation and other sources deserving confidence. I am happy to state that the general condition of the agricultural interest in this section of our widely extended country is very healthy and prosperous; more so than I have ever witnessed it before in a period of 13 years' residence. And, by the blessing of Providence, no people on the habitable globe are better prepared to live more comfortable and happy, would we but use the proper means to insure ourselves the rewards of industry, frugality, and enterprise. It is true that, in some things, we are far behind our colaborers in other sections, who have been blessed with advantages which we do not possess; but, at the same time, there is visible a spirit of improvement, which will gradually be infused among a people whose efforts are to advance in their respective callings; and we now see dawning upon us a general prosperity, the sure

reward of a people whose minds and energies are directed to an honorable pursuit.

With these preliminary remarks, I shall now proceed to answer the inquiries set forth in your circular.

Wheat.—My report for 1849 gives as fair an account of the condition of wheat culture in this section as could now be made out without repetition. In Columbus, Georgia, 45 miles north of this, extensive flouring mills have been established, which must, in time, encourage the growth of wheat. At present, much grain is imported from the West, to keep 3 mills in operation. The flour made is of very superior quality, equal to any of Northern manufacture.

Corn.—The most esteemed variety is the white corn; and, by proper management and cultivation, it will average from 25 to 35 bushels per acre. Of late years, much attention is bestowed to selecting the corn for seed, and it is better cultivated than heretofore, which results in a heavier yield per acre. From the protracted drought in May and June, the corn crop has been materially shortened; but sufficient has been harvested to meet the wants of the county.

There was introduced last spring, by Colonel Eli S. Shorter, a planter in this county, two new varieties of corn, the "Oothkalooga" and "Early Ohio Flint," which he pronounces to "have made the best corn he ever saw," yielding from 50 to 70 bushels per acre without manure. Some ears of the first-named variety were the largest I ever saw. I have handed Colonel Shorter one of your circulars, and requested him to make out a report for your department: in so doing, he will give a full account of this corn, its culture and production. The introduction of such seed among us will largely increase the production of corn, which, I think, can be made for 40 cents per bushel. My system of culture is to break the land deep at first, with large skooters, lay off the drills 5 feet apart, drop the seed 30 inches apart. In laying off furrow, manure at the same time with cotton-seed, and cover the corn and manure by running a light skooter-furrow on each side of it, and breaking the balk thoroughly out with shovels. This, however, is not the general system, as many still adhere to the old hill culture and covering with the hoe; and some in drill plant in a bed, covering with a board on the heel of the plough-stock. For my own part, I have found the first-named system most successful, and the after-culture easier. Three ploughings, and a hoeing after the first and last ploughings, is the culture given to corn, and the sweep-plough is becoming the one most in use for this purpose, as it performs the work rapidly, and, at the same time, stirs the land thoroughly. As regards feeding corn to stock, it is usually fed in the ear, as gathered, and the true economy of preparing by mills, or boiling, is lost sight of. I know of no experiments or calculations having been made in turning grain into manure by feeding stock of any kind.

Your next inquiries are in relation to *oats*, *barley*, *rye*, *peas*, &c. Oats, rye, and peas are extensively sown, but of barley and beans, none to my knowledge. Oats are sown down after corn, in October and November, and sometimes in February, from 3 pecks to a bushel per acre. I am partial to putting much seed in the ground, and have always done best when sown thick. Average yield, from 15 to 20 bushels per acre.

I deem this crop more exhausting to land than any other of the grains above named; it does best on low, wet lands, and we find it stands the winter's cold better on such lands than on high, dry, porous soils, where it is

often winter-killed. When chopped and mixed with corn, oats make an excellent summer food for our mules and horses; as a renovator of land, I cannot speak of it as beneficial, further than its stubble prevents washing.

Rye is sown down for green pasturage more than for its grain, and serves as an excellent winter pasture for young stock to run upon; and I am only surprised that it is not more generally thus sown than it is, especially on broken lands, where it would prevent the washing of the soil during the winter rains, and, early in the spring, might be turned under to rot, in time for a late-sown crop. I have known instances where the overseer, in picking cotton in the fall months, scattered the seed ahead of the pickers, by whom it was trampled in, and in due time a good stand was had, with little or no trouble, furnishing a fine winter pasture, and, on undulating lands, preventing the alleys of the cotton-beds from gullying by the rains. The average yield is about 15 bushels per acre.

Peas.—These may be made one of the most valuable products of the South. Heretofore, and even now, a proper estimate is not set upon their beneficial qualities as a renovator. In this respect, they can be made to the South what clover is to the North and West. It is true that my experience with peas as a renovator is limited; but, so far as tried, very satisfactory, and I am now engaged in saving a large quantity for sowing broadcast on my corn lands next summer. I have never seen a piece of ground sown exclusively with peas for the purpose of turning them under as a fertilizer; but I have conversed with those who have tried it with very successful results. The manner in which have I tried them is in the last sweeping given to corn, sowing them broadcast before the ploughs, where they shade the ground completely from the penetrating heat of our summer's sun, protect the land, and keep the roots of the corn moist and cool, which, in a dry time, very much aids the corn in maturing well. In the fall, by early breaking up the ground for another crop, a vast amount of vine and litter is turned under to rot, which makes manure. By this system, but a partial benefit is derived from the peas as a renovator, although, considering the protection afforded to the corn from the influence of heat upon its roots, the preserving of the land from washing, and the keeping under of the noxious weeds and grass, this plan, involving but little labor and trouble, is well worthy the attention of planters.

Again, the vines, with the peas on, can be pulled up and cured so as to make an excellent winter forage for cows, mules, and sheep; in this way they readily fatten animals, very much increasing the milk of cows, if put away in a barn underneath which cattle can go and reach them through slat floors and racks. Or, they may be littered in lots, so as to make an abundance of manure. Thus a large amount of corn is saved, and stock can be wintered more economically than in any other method.

It is only with a certain class of planters, however, that this system will be adopted; for the putting in of the pea-seed is at a time when cotton-picking is most pressing, and where making large crops of cotton is the prime consideration of the planter, all other objects are lost sight of, embracing a general system of raising all things at home, which is the farmer's true policy and interest. Cotton is now bearing a high price, and the whole energies of the planters are bent on making all they can. The result will be, that they will find themselves dependent upon others for every thing they need, having neglected their provision crops, stock, &c. for cotton.

We are unable to answer your inquiries about *clover* and the *grasses*, they

not being cultivated in this section of country; also *dairy husbandry*, as nothing is done in this branch of rural industry, except for domestic wants.

Neat Cattle.—The cost of raising neat cattle to the age of 3 years may be set down as merely nominal; for, in summer, they are sustained by the range, and, in winter, the run of the fields with shucks is found sufficient. At 3 years old, in beef, they are worth from $7 to $9, and as stock cattle, from $4 to $5. The value of dairy-cows ranges from $12 to $25, according to their quality as milkers. As regards the amount of food required to fatten different breeds of cattle, we are unable to say, as with us blooded stock is scarce. Beef is used only in the summer months, where fattened by the range. Fall beeves, killed and cured for winter use, are generally fattened in the pea-fields.

Sheep and Wool.—We cannot answer the inquiries in your circular, for sheep have not been raised for the wool, except for domestic use. The breeds here are the most common kinds, and the average clip not more than 1½ pound per head. In Columbus, Georgia, 45 miles north, are several large woollen-factories, lately established, and others now being erected, which will cause a demand for wool, and be the means of turning the attention of farmers to this important branch of business, now entirely neglected. I have been thinking, for some months past, of investing some capital in sheep, for the purpose of selling wool to the Columbus factories; and it strikes me that, with little trouble and good management, it can be done successfully and with profit; for we possess many advantages here in climate, woods-pasturage, and rye-fields, so that little expenditure is necessary in raising and sustaining them.

Again, our factories at present, and perhaps for years to come, will require but the coarser kinds of wool, as they manufacture coarse fabrics. This will enable us to begin with the common breeds, and, by importing blooded stock, to cross and improve the breeds gradually; thus ascertaining what breeds turn out the heaviest fleeces, and the quality most needed by manufacturers. No one can read the letter of Mr. Mark A. Cockrill, of Nashville, Tennessee, on the raising of sheep at the South, in the Patent Office Report for 1848, without feeling deeply interested on this subject. He has removed all doubts, done away with prejudices, and opened the way for all who may be disposed to make the trial, and who must succeed, with good management on his own part. With the farmers of the South, the starting of factories in our midst should be hailed with pleasure, and supported with zeal, for we have it in our power to supply the raw material, cotton and wool, and the food of their operatives. In short, an exchange of products is all that is necessary for us to be satisfied that we can, at last, live at home; and creating a diversity of products, and drawing our minds from the one object, cotton-planting, will add to the comfort of the farmers, and result beneficially to the country at large. Wool-growing I deem an advantage to the South, and no time should be lost in procuring the necessary stock and raising large flocks of sheep. The manufacturers now import from foreign countries 8,000,000 pounds of wool a year, to carry on their business. With this deficit in the supply, should we not be encouraged to furnish our own manufacturers, knowing that factories are on the increase, and being erected at our very doors?

Hogs.—The native or common stock we find to answer our purposes best, owing to its hardy habits, and being the most thrifty range-hog. There is

no doubt, however, were proper attention paid to hogs, the improved breeds would be found most profitable; but among cotton-planters, and especially when prices range high, they raise only for their own supply, and import Western bacon for their negroes. What few hogs of improved breeds we had brought to the country did well so long as they were kept up, well fed, and attended to; but when turned on the range, they dwindled away to nothing. Pasturage is necessary for pork-raising, and, with the cotton-planter, none, comparatively speaking, is to be had; hence it is we are deficient in this branch of agricultural industry. Our climate, too, is so variable and uncertain, that it is a hard matter to save what pork is raised in the country. The drove-pork purchased is often much injured in saving, and the risk is so great, that the planters feel safer in purchasing their bacon from New Orleans, than in raising and curing. In putting up our meat, the worst enemy we have to contend with is the skipper-fly, which produces a bug that in summer destroys it. Many preventives against this enemy have been resorted to, but none, so far as I have heard, has proved entirely successful. Some have buried their meat in salt, some in fodder and shucks, and others in charcoal; still the ravages of this bug are manifested. So far as my experience goes, I have found it best, when the bacon is well dried, to take it down and brush it over carefully; have a large box in readiness, and pack it away in pulverized charcoal. It keeps better in this way than in any other that I have tried.

Cotton.—The season has been considered unfavorable, particularly to the upland crops, which are set down at 500 pounds per acre. It is allowed that it takes 1600 pounds in the seed to make a bale of 450 pounds clean cotton. The rotation of crops is governed by no regular system, for where corn and cotton are the only crops planted, cotton is generally run the longest, on lands best adapted to it, while the corn crop is kept up by manuring highly with cotton-seed. But, where the small grain crops are sown down, the rotation is corn after cotton, and cotton after small grain. So far, no preventives have been found against the rust and boll and army worms. Cotton can be made here at a cost of 5 cents per pound.

In relation to the remaining inquiries on your circular, most of the articles are not grown among us, while others are grown in such small quantities as to afford no important conclusions as regards production, culture, &c.

Very respectfully,

JNO. H. DENT.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Lake Swamp, Horry District, S. C., November 25, 1850.

Sir:—In reply to your inquiry relative to the culture of sugar-cane, and its premature decay from rattoons, &c., I can give you but little information, as I have never depended on rattoon crops. But so far as my experience goes, I think the cane does become inferior, shorter joints, and produces less juice than formerly. I have raised sugar-cane for four years, from the planting each year; and though I am 35 or 40 miles from the seaboard, and within nine miles of the North Carolina line, my cane does well, and I think it a profitable crop. I am of the opinion that cane can be raised in South Carolina or North Carolina, anywhere within 40 miles of the sea-

coast, to considerable advantage, and I do not think the time to be very distant when the sugar-cane will form a portion of the crop on every well-conducted farm; at least, enough for home consumption. Experience has taught me that this would be for the interest of every farmer.

I have had some experience in feeding apples to hogs, and can say that sweet apples will fatten them as fast as potatoes, but sour apples will not. I have a kind of apple, called Sweet James, which ripens in the month of June, and bears very full. I would as soon have a bushel of them for my hogs as a bushel of sweet potatoes; but when these were gone I fed on sour apples, and my hogs lost flesh, instead of gaining.

As to raising rice on high or upland, it is quite common. The gold rice or white-hull rice does well. There is a certain kind of soil, however, on which it prospers best, and that is a level, sandy soil, inclined to moisture. On such land, I have known the yield of rice to be three bushels to one of corn, from the same field.

Yours, with respect,

THOMAS A. BEATY.

Value of Dry Goods entered for Consumption, at the Port of New York, during the years 1849 *and* 1850.

MONTHS.	WOOLLENS.		COTTON.		SILK.		FLAX.		MISCELLANEOUS.		TOTAL.	
	1849.	1850.	1849.	1850.	1849.	1850.	1849.	1850.	1849.	1850.	1849.	1850.
January	480,591	1,585,186	1,108,448	1,774,838	2,196,750	2,061,815	402,275	1,055,755	381,881	270,898	4,569,945	6,748,492
February.....	893,311	1,266,968	1,609,522	1,106,145	1,572,382	1,861,499	467,441	685,157	404,169	270,504	4,946,825	5,190,273
March	582,065	802,202	1,048,282	946,597	963,619	1,191,433	537,847	754,261	385,833	174,563	3,517,646	3,869,056
April	587,540	1,321,310	557,472	1,148,239	883,876	879,996	345,225	1,348,491	299,776	165,117	2,673,889	4,863,153
May.....	237,652	768,810	275,090	556,829	267,592	1,030,895	176,877	198,931	798,931	52,528	1,756,142	2,607,993
June.....	474,237	596,170	376,450	289,551	454,577	835,351	158,000	215,398	151,737	72,100	1,615,001	2,008,570
July.....	1,020,673	3,552,120	817,520	1,607,775	1,784,797	4,572,161	231,650	741,095	262,297	380,698	4,116,937	10,853,849
August.....	2,963,604	2,254,069	1,142,686	943,925	2,859,992	2,803,145	706,075	619,777	361,336	383,468	8,033,693	7,004,384
September.....	1,330,783	1,380,248	548,316	546,523	1,130,523	1,874,495	443,266	483,040	209,243	342,998	3,662,331	4,627,304
October.....	600,413	576,580	269,654	314,028	529,063	762,231	227,291	451,455	95,184	202,295	1,721,605	2,306,589
November.....	418,534	379,399	245,812	267,516	501,270	673,438	291,829	323,704	101,332	240,445	1,558,277	1,884,502
December	465,659	225,717	368,264	306,972	764,762	582,307	224,134	216,914	139,072	123,195	1,961,891	1,455,105
Total entered...	10,055,062	14,708,779	8,367,216	9,808,938	13,909,203	19,128,766	4,211,910	7,093,978	3,590,791	2,678,809	40,134,182	53,419,270
Add withdrawn.	1,928,217	1,856,237	1,152,756	1,229,457	1,386,550	1,152,268	544,651	468,963	368,419	203,628	5,380,593	4,910,553
Total passed to consumption..	11,983,279	16,565,016	9,519,972	11,038,395	15,295,753	20,281,034	4,756,561	7,562,941	3,959,210	2,882,437	45,514,775	58,329,823

Dry Goods Reporter.

Portland, January 16th, 1851.

Sir:—Some 8 or 10 weeks ago, I received a circular from the Patent Office, making inquiries concerning agriculture in this section, the which numerous pressing engagements have hindered me from considering until now.

Our farmers are by no means systematic or scientific in their agricultural operations; and, could they be induced to profit by the teachings of science, I am well satisfied that the result would be at least the doubling of their crops, with less labor than they now bestow on their farming operations. The experience of some two or three systematic and, to some extent, scientific farmers, with whom I am acquainted, bears me out in this opinion. I am happy to add, however, that there seems to be a growing interest in regard to the matter, induced, perhaps, by the operations of our county agricultural societies.

But to your inquiries:—

Wheat.—We raise comparatively little wheat in this (Cumberland) county, and, indeed, in the whole State—not *half* enough, I think, for home consumption. In 1850, 169,879 barrels of flour were imported into Portland alone, much of which went into the interior. However, since the failure of the potato crops, our farmers are turning their attention to the more extensive cultivation of wheat—the kinds most in use being the Kloss blue-joint and white flint seeds. These varieties, so far as I have been able to learn, have not as yet been attacked by the weevil. The time of seeding is in all September: of harvesting, from the 1st to the 20th August. The average product cannot, I think, exceed 15 bushels per acre, owing to the unskilful manner with which it is cultivated. The seed is not prepared in any way—5 pecks of seed is about the usual quantity used per acre in planting; average price per bushel, $1.37½ cents. The ground is generally ploughed twice; depth, I think, not more than 6 inches. We have no system for rotation of crops; know of no remedies for flies or weevils. The yield per acre is increasing.

Corn.—The "Golden Field" variety is the only one planted; average product per acre, 45 bushels; cost of production per bushel, I should judge, might be set down at 55 cents. Most approved method of fertilizing is by spreading the manure broadcast. Our farmers generally plant in "hills," one hill to about every 12 square feet of ground, and hoe twice or three times. The best method of feeding it to hogs is, I think, decidedly, ground and cooked, or scalded. We raise more corn than wheat, but not enough for home consumption, 222,641 bushels having been imported into Portland last year. That corn can be raised in this section to advantage, I have abundant reason to believe. Last year, I knew an *amateur* farmer to raise 92½ bushels to the acre, and, as secretary of the Cumberland County Agricultural Society, in 1849, a written statement was put into my hands, *sworn to* before a justice of the peace, that the writer had raised, on one acre of ground, the almost incredible quantity of 123 bushels and 26 quarts of round yellow or golden-field corn!

With regard to the cultivation of oats, rye, and barley, there is a diversity of opinion here. I should judge the average yield per acre of oats was 20 bushels; of rye, 20 bushels; of barley, 25 bushels; average quantity of seed per acre, oats, 6 pecks; barley, 6 pecks; rye, 5 pecks. About enough

of each of these grains is raised for home consumption. Peas, so far as I know or can ascertain, are not cultivated as a renovating crop. Beans are not much cultivated as a field crop, except among the hills of corn, one and sometimes two seeds being used to the hill. In this way, perhaps, an average of 8 bushels is raised to the acre. Separately and alone, I have heard of 35 bushels of beans being raised to the acre.

Clover and Grasses.—The grass crop of this (Cumberland) county is one of the chief dependences of the farmer, and generally, perhaps, his most certain and profitable crop, as things now stand. Much hay is annually exported from Portland to New Orleans and other Southern ports. I have known of 4 tons being cut to the acre on richly manured lands, but think the average quantity throughout the country cannot be more than 1¼ tons to the acre. The best fertilizer for mowing fields, where it can be had, is what is called "mussel-mud"—the mud and shells dug from salt-water flats or mussel-beds. Algæ, or sea-weed and kelp, thrown up on our sea-shores by storms, are also used, wherever they can be obtained, as fertilizers, and with much success. In the interior, ground plaster is used with most encouraging results, especially on heavy, clayey lands. Each of these manures is generally used as a top-dressing. Stable and barn-yard manures are also used. By "meadows," I presume you mean mowing lands generally. The seeds used in laying them down generally are herds-grass and clover—different lands requiring different proportions of the two seeds—but, on an average, I should estimate the proportion at ⅔ herds-grass, ⅓ clover. Red-top and foul-meadow are used in laying down boggy lands, or what are here called meadows. I do not think the average quantity of seed used in laying down grass lands is over half a bushel to the acre; but our farmers would find it to their advantage to use more. The average cost of growing hay per ton I shall set down at $5; average price from one year to another, $8 per ton. The Southern clover-seed does not work well here at all. I have known a skilful farmer enter upon a new farm, and, by the application of mussel-mud, plaster, and stable-manure, and the manure made by some half a dozen hogs, which he almost solely kept for the purpose, in the course of 7 or 8 years, increase the hay crops of his fields from 15 tons up to an average of 100 tons.

Hemp is not cultivated in this county, nor, so far as I am aware, in the State. It has been frequently tried; but without success.

The growing of carrots, turnips, and beets has been on the increase, as a field crop, since the commencement of the ravages of the potato disease, previous to which but little attention was paid to them as articles of agriculture: I have, therefore, but little experience on which to found an opinion as to the best mode of growing. I have an instance in mind where 900 bushels of carrots were raised to the acre; I should think the average yield of carrots and beets might be put down at 600 bushels per acre each. English turnips are not planted to any extent as a field crop. Ruta-bagas, however, are beginning to be planted extensively. Their yield will go above that of carrots and beets; but I am unable to give any definite information on the subject.

I cannot, from personal experience, afford any information as to dairy husbandry, neither have I been able to obtain satisfactory information on the subject.

Your interrogations in regard to neat cattle are likewise almost equally out of my line of experience. In Cumberland County, we have only here

and there a single specimen of full-blooded *Durham;* and as to Devon or Hereford, I know of none in the country. Still, there may be some of each. The cost of rearing 3 years' old neat kine of our mixed breed is from $18 to $20 per head. The value of good dairy-cows in spring and fall averages about $25.

I am unable to give correct information in regard to sheep or wool-growing.

The best breeds of hogs, I believe, are the Berkshire, and a species called here the "Newbury White," and a cross of the two. The Newbury White fatten with a small amount of food, but do not grow very large. Most farmers, I believe, prefer the cross breed. The only method of putting up pork, is by packing in barrels, in salt pickle, excepting that a few hams are well smoked; but as to the manner of curing these latter, I am not able to give information.

Potatoes.—Prior to the advent of the disease, the average yield might have been put down at 200 bushels per acre, and they would pay for raising at 16 cents per bushel; but recently they cannot be considered a paying crop, generally, at four times that price. The varieties least subject to the *disease*, are the Churchill, (so called here,) the peach-bloom, and early blue. It was for some time thought that seeding the potato would prevent its decay, but this hope has proved fallacious, and I know of no preventive of the potato-rot or disease. I have tried experiments; have tried with the strongly recommended *peat-charcoal*, pulverized, for instance, but without satisfactory results. I shall, however, give it a further trial. Potatoes grown on *new* ground, without manure, suffer least. The method universally practised here, is planting in hills, about one hill to the square yard, and hoeing after the plants are 3 or 4 inches high. Some farmers hoe twice. As to manuring, some farmers spread manure on the land, before breaking up; some manure in the hills; no general system. We raise no *sweet* potatoes.

Fruit.—The culture of fruit is receiving increased attention in this county, and, I am inclined to believe, in the greater portion of the State. The apple crop, I think, *can be* made the most profitable one the farmer raises; and some of our farmers have, I believe, discovered this to be the case. The varieties here esteemed best for keeping, are the Baldwins, the Greenings, and Russets. Those who have had experience on the subject, say that in feeding hogs and cattle, if you can sell your apples at 37½ cents per bushel, and buy corn at 66 or 70 cents, you will be the gainer.

Manures.—The use of lime is little understood with us, and little used. Plaster (ground) is used successfully in the interior, on almost all kinds of crops. Mussel-mud works better on grass land than with other products. Guano has not worked so well here as on older cultivated lands, where the ammoniacal properties have been more nearly extinguished. Pulverized peat-charcoal, (a new article,) I am disposed to believe will be found to be a most excellent fertilizer; especially, composted with other manures. It is a *perfect* deodorizer, rendering human excreta and the most offensive offal, entirely scentless, as I have ascertained from frequent experiments. Hence its discovery will prove of great utility to the world, in a sanitary point of view, as well as for its fertilizing qualities; and I am happy to add that a large manufactory of the article is just going into operation in our vicinity.

Meteorology.—The enclosed printed slip will afford all the information I can give on this head. I procured it for publication at the *Observatory*, a

tall, octagonal building in our city, where inbound vessels are signalized in the offing.

With regard to the quantity of *rain*, I think it cannot average far from 35 inches per annum. Dr. William Wood, of this city, keeps a rain-gauge, and has promised to favor me with more specific information; but thus far I have not been able to find him sufficiently at leisure to fulfil his promise. Professor Cleaveland, of Bowdoin College, Brunswick, I believe keeps a rain-gauge.

Very respectfully yours,

S. B. BECKETT.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Thermometrical Table for December, 1850.

Date.	Sunrise.	Noon.	Sunset.	Date.	Sunrise.	Noon.	Sunset.
Dec. 1	30°	43°	34°	Dec. 16	17°	37°	34°
2	26	32	31	17	32	32	28
3	28	30	34	18	11	20	14
4	32	36	38	19	0	10	10
5	38	39	33	20	14	22	20
6	28	36	31	21	4	20	18
7	20	20	22	22	14	18	14
8	22	24	18	23	14	16	8
9	18	31	26	24	0	7	4
10	24	34	24	25	2	15	16
11	10	24	22	26	10	26	28
12	26	34	22	27	15	32	26
13	8	14	10	28	28	31	24
14	4	21	19	29	4	11	14
15	18	32	26	30	2	12	14
				31	5*	10	18

REMARKS.—The average temperature for this month is 27°; 3° warmer than the average for the last 31 years, but colder than any December since 1846. The highest for the month was on the 1st at 43° above zero; the lowest was on the 31st, at 5° below zero.

* Below zero.

The following Table gives the Average Temperature for each Month of the Year, and the Highest and Lowest for each Month.

	Highest.	Lowest.	General Average.	Average for 30 years.
January	41°	1°*	23°	20°
February	45	14*	28	21
March	47	2	31½	31
April	71	17	37	33
May	64	26	47	44
June	89	43	62	60
July	84	50	67½	66
August	83	44	66	64
September	76	36	56	56
October	65	26	49	45
November	70	20	38	33
December	43	5*	27	24

* Below zero.

Observatory, January 1st, 1851.

The following table exhibits the average for the last 31 years, on the mean of observation, noted at sunrise, at noon, and at 8 o'clock, by the same thermometer, (Fahrenheit,) and continued in the same situation, and exposed to a true current of air; also, the highest and lowest degree indicated by the same thermometer, for each of the years, with the atmospheric temperature of Portland:—

Thermometrical Register, kept at the Portland Observatory.

Years.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Highest for Y'r.	Lowest for Y'r.	Average Temp.
1820	16°	24°	27°	40°	50°	62°	70°	65°	60°	46°	34°	19°	98°	15°	42⅜°
1821	13	26	28	38	51	61	63	66	58	46	39	22	90	17	42½
1822	15	21	34	39	53	62	66	64	60	47	37	23	88	15	43¼
1823	19	15	27	40	48	58	65	66	56	46	31	26	90	11	41¼
1824	22	22	32	41	49	58	65	63	59	46	32	28	82	18	43
1825	21	23	33	44	51	64	71	64	57	49	36	28	100	12	45
1826	22	23	32	39	56	62	68	66	59	49	36	28	97	24	46
1827	16	21	31	44	51	59	67	64	59	49	30	24	94	13	43
1828	23	31	32	39	51	63	63	66	60	46	38	30	90	5	45
1829	18	18	28	41	55	50	65	65	54	46	35	32	94	15	43
1830	17	19	31	45	51	59	67	65	56	48	43	30	96	18	44¼
1831	18	21	36	43	53	65	68	68	59	49	37	12	91	10	44
1832	21	20	30	37	48	57	62	63	56	48	36	23	93	15	42
1833	22	17	20	41	53	57	66	62	56	46	33	26	92	15	42
1834	16	27	31	41	46	58	68	64	59	44	35	20	90	18	41
1835	21	18	27	38	51	60	67	63	55	49	34	17	92	18	41½
1836	20	14	28	36	50	56	66	61	56	41	33	23	93	17	40
1837	14	19	26	38	46	58	63	61	54	43	34	24	84	11	40
1838	28	14	32	36	49	62	68	64	56	43	30	20	92	5	42
1839	20	22	30	41	49	56	65	64	57	48	34	28	86	10	43
1840	13	28	30	42	51	61	67	67	56	46	34	21	87	10	42½
1841	25	25	28	37	48	61	65	66	60	42	35	27	92	2	48¾
1842	22	27	33	41	48	57	67	64	55	46	34	20	92	6	43
1843	26	15	34	38	50	59	63	66	58	45	32	25	86	6	41¾
1844	13	21	30	45	52	61	64	63	58	45	34	24	86	14	43⅓
1845	21	21	30	39	51	62	65	66	55	47	40	20	88	5	43
1846	21	16	32	44	50	60	66	66	67	45	39	24	97	4	46
1847	20	20	27	37	49	59	69	64	58	44	38	29	94	8	42
1848	25	25	29	45	51	60	66	65	55	46	35	30	96	14	44⅓
1849	17	15	31	39	48	65	66	66	58	46	42	28	94	12	42
1850	23	28	30	37	47	52	67	66	56	49	38	27	89	14	44

Augusta, Kennebec County, Maine, December 20, 1850.

Sir:—The following observations on a few of the topics embraced in your late Agricultural Circular are respectfully submitted for your consideration.

Wheat.—Previous to 1839, spring was pretty generally cultivated in this section of the State, but since the depredations of the wheat-midge (grain-worm, or weevil, as it is called here) have become so extended, the crop has been very precarious, and generally unprofitable, until, at the present time, comparatively little of it is sown. Within three or four years, the attention of farmers has been directed to the cultivation of winter wheat, and the success that has attended those who have given it a fair trial, is truly encouraging. Winter wheat, here, is seldom or never injured by the midge when it is sown in proper season. J. D. Lang, Esq., of Vassalboro', several

years ago, introduced a variety of winter wheat from Poland, which has, thus far, stood our winters well, and yielded a very satisfactory return. The Kloss blue-stem has been extensively introduced, principally by the exertions of Rev. William A. Drew, of Augusta, who, six years ago, sowed in his garden a few kernels of this variety, which were sent from the Patent Office, from the produce of which, it has been estimated, that at least 5000 bushels were sown the past autumn in the valley of the Kennebec. Several other varieties have been cultivated. Nearly every bushel of the last crop of winter wheat raised in this State was used for seed, and it sold readily at an average price of more than $2 per bushel. Moses Taber, of Vassalboro', who cultivates the Poland variety, harvested, the present year, 50 bushels from 1½ acres. Other varieties have done as well as this. Mr. Taber, in a communication in the Maine Farmer, remarks, that where the proper method of cultivation has been pursued, the average yield, in this vicinity, for five years past, has been about 20 bushels from 1 bushel of sowing, and in no instance has there been a failure, or less that 14 bushels to the acre.

The method of cultivation adopted by many, is as follows:—The ground is ploughed in July, or early in August, and afterwards it is top-dressed with compost or well-rotted manure, which is thoroughly incorporated with the soil. The most favorable time for sowing is from the 20th to the last of August. The seed is covered with a small horse-plough, and the ground is rolled. The amount of seed recommended for the acre varies considerably. Mr. Taber sows from a bushel to a bushel and a peck, while others consider it best to sow from 2 to 3 bushels to the acre.

Indian Corn is very generally cultivated in this portion of the State, and it is regarded by many as the surest crop raised. An eight-rowed, yellow variety is the most common for field culture, although the twelve-rowed is raised to some extent. The usual planting-time is from the middle of May to the 5th of June, and the common varieties of corn planted during this period usually ripen well in the month of September, and before the frosts injure it. Corn is generally more highly manured than any other field crop, and its cultivation is seldom attempted without manure. Most farmers spread a portion of their manure, and apply the remainder, which must be well rotted, in the hill. The cultivator, plough, or harrow is used among the corn at each leafing, and the corn is usually hoed twice. The stalks and husks are used for fodder for neat stock. The expense of raising an acre of corn may be estimated at about $15, exclusive of manure; the fodder being worth the expense of harvesting. Beans or pumpkins are usually raised with the corn. Mr. Guild, of Sidney, raised 190 bushels of ears, or 95 bushels of shelled corn, to the acre. Mr. Wadsworth, of Kennebec, raised 72 bushels of shelled corn to the acre; and Mr. Snell, of Winthrop, raised 71 bushels, at an estimated cost of $17. These are among the best crops which were raised in this vicinity in 1849. The crop of the present year, I think, is full equal to that of the last. The average price has been not far from 80 cents per bushel. The average yield, per acre, I think, may be set as high as 30 bushels.

Potatoes.—Twelve years ago, it was estimated that more than $250,000 were paid for potatoes sent out of this State by way of the Kennebec river alone. Now, there are not enough, which are free from disease, to supply the wants of the inhabitants. Potatoes are now being sold in this market at 60 cents per bushel; but the disease is so prevalent that traders and con-

sumers are unwilling to purchase more than enough to supply their immediate wants. Last year, the potatoes in this vicinity were less diseased than they had been for several years previous; but this year, on some farms with which we are acquainted, they have rotted worse than ever. The summer of 1849 was unusually dry, while the spring and summer of 1850 have been wet. This difference in the seasons may have had something to do with the rot.

Turnips, and other Root Crops.—Turnips, and the root crops which are generally cultivated, may be successfully raised here, and they are, to some extent; but too little reliance is placed upon them for the support of stock. The hay crop is the most valuable one in Maine, and upon it nearly all our farmers are greatly dependent. For five years past, we have had a succession of good hay seasons, and the farmers have not considered it necessary to raise many roots for their stock. So far as I have observed, it appears to me that the root crops do not now receive more attention, perhaps not so much, as they did 10 years ago, among farmers in this vicinity. I can hardly account for this neglect, more especially since the failure of the potato crop. The root crops most cultivated here are ruta-baga, turnips, and carrots. In 1849, Mr. Watson, of Fayette, raised 425 bushels of ruta-bagas from half an acre, at an expense of $25. The same year, Mr. Taber, of Vassalboro', raised 395 bushels from half an acre, at an estimated cost of not more than 4 cents per bushel.

Fruit Culture.—An increasing attention is being paid to the culture of fruit. Many new orchards are being set out, and the old ones are being renovated and ingrafted. Our apples, for keeping qualities, are unsurpassed; and there is usually a ready market for all the good fruit that is raised, at remunerating prices. No branch of business, it is thought, will yield a better or surer return, in this part of the State, than orcharding, or fruit-raising, when properly conducted. A gentleman who has had considerable experience in these matters, calculates that an orchard of 12 acres, well cared for, will yield a clear annual profit of $800. Prime apples have averaged at least $1 per barrel in our markets; and when we take into consideration our facilities for sending them abroad, and their keeping qualities, it seems highly probable that they will continue to be in demand at fair prices. For three seasons past, we have not had a full crop of apples, although some orchards and some particular varieties of ingrafted fruit have done very well.

Meteorology.—The following, which is copied from the thermometrical record, as kept at the Insane Hospital in Augusta, will exhibit the mean temperature of the thirteen months previous to November last, together with the quantity of rain which fell, and the number of wholly fair and stormy days in each month.

Month.	6 A.M.	2 P.M.	9 P.M.	Range.	Inches rain.	No. wholly fair days.	No. rainy or snowy.
October, 1849.....	42.	51.	44.60	31 to 60	5.23	17	11
November, 1849...	39.13	47.26	41.26	31 to 59	3.49	9	10
December, 1849...	17.33	26.66	20.75	6 to 43	0.47	9	10
January, 1850.....	11.41	27.20	21.	3 to 43		14	9
February.....	19.75	32.75	25.25	12 to 47	3.30	14	4
March	23.16	35.22	28.47	4 to 53	2.18	18	6
April	32.67	46.33	37.	19 to 66	1.65	20	4
May	45.54	56.54	48.83	39 to 73	10.27	12	8
June.....	59.66	74.66	62.50	46 to 92	5.91	19	11
July.....	64.	74.35	67.60	52 to 96	3.98	16	11
August.....	60.12	73.45	64.	52 to 86	3.95	15	7
September.....	54.50	68.	58.67	42 to 82	3.70	16	7
October.....	45.20	57.40	48.90	31 to 68	5.26	11	7

REMARKS.—The autumn of 1849 was unusually mild. The rains of early autumn, succeeding the severe drought of summer, seemed to infuse new life into vegetation. Roses and dandelions were frequently seen in blossom in October, and ripe raspberries and strawberries were gathered in the open fields during the same month. There was hardly frost enough to check vegetation until the 1st of December. The coldest weather for 12 years past was in February, 1850, the mercury, at one time during the month, remaining below zero for more than 36 hours in succession. The last spring was wet and backward. An unusual number of freshets have occurred during the season on the Kennebec and its tributaries, which were attended with considerable loss of property. The freshet of May 25th was greater at Augusta than any which has occurred since 1832. The navigation of the Kennebec was closed about the 5th of December, 1849, and the ice left the river April 1st, 1850.

AGRICULTURE OF AROOSTOOK COUNTY.

Before closing this communication, I wish to call attention to the wild land in the north-eastern part of Maine, and say a few words relative to the soil, products, and agricultural prospects of this new country. I have travelled, during the past autumn, some 200 miles in the county of Aroostook, visiting the principal settlements, and noticing, so far as I had opportunity, the success that had attended the hardy and industrious pioneers. There are many thousands of acres of very good land in this county, which, by industry and skill, may be converted into beautiful and productive farms. From what I there saw, I feel confident in the opinion that the valley of the Aroostook is the best grain-growing district in New England. Much of the land lies in beautiful ridges or swells, not too abrupt for cultivation, it is well wooded, there is a great abundance of noble cedars for fencing and other purposes, and the soil is deep and fertile, and generally free from stones. There is an abundance of lime in almost every township, and an inexhaustible supply of gypsum may be conveniently obtained from New Brunswick.

The crops of the past season were excellent. I have never seen any better wheat, oats, buckwheat, millet, and potatoes, than I noticed on this journey; and the average yield of all these crops is much greater than in the older settled portions of the country. With the single exception of

Indian corn, (and I saw some good and well-ripened corn there,) the field crops of Aroostook county will not suffer by comparison with those of the most favoured portions of our county. The potatoes are of very superior quality, and, in many neighbourhoods, they appeared to be entirely free from disease.

Mr. J. W. Haines, who resides in township letter D, informed us that, for the last 3 years, his wheat averaged 25 bushels to the acre for the first crop after a burn, and 20 bushels for the second. This crop, last year, averaged upwards of 30 bushels to the acre. His oats yield 60 bushels to the acre.

The following statement of the amount of crops raised the present year by Mr. John F. Goss, of Presque Isle plantation, was communicated to me by a trader of that place, whose name I do not now recollect. He assured me that reliance might be placed upon the correctness of the statement. The prices affixed were what he regarded as the fair market value of the articles in that township. Mr. Goss, in raising these crops, had only the assistance of his son, 17 years of age, and a hired man 4 months.

25	tons of hay, $8 per ton	$200
700	bushels of oats, 30c.	210
100	..... wheat, $1.25	125
200	..... buckwheat, 50c	100
40	..... millet, 75c	30
25	..... rye, $1	25
30	..... corn, $1	30
300	bushels of potatoes, 20c	60
100	..... turnips, 20c	20
300	..... carrots, 20c	60
6	..... beans, $1	6
		$866

Hon. John Hodsdon, of Houlton, raised, in 1849, 54 bushels of spring wheat to the acre, and the present year his crop was at the rate of 45 bushels to the acre. These examples (and their number might be much enlarged from the materials before me) are very encouraging: they speak well for the agricultural resources of the county.

A gentleman, who has had much experience in draining new land in this part of the State, informs me that he hires the trees felled for 3 dollars per acre, and pays only 7 or 8 dollars an acre for draining. At this rate, the first crops not unfrequently yield a clear profit of $15 per acre, besides paying for draining the land.

It is true the county of Aroostook lies far to the north, being in latitude about 46°. The seasons are short, and there are probably some frosty locations; but we saw nothing while there to lead us to suppose that much of the land is so liable to frost as to render it unsafe for the principal crops in ordinary seasons. There was no frost to check vegetation until after the 25th of September. The snow generally falls early and covers the ground until spring. Besides the advantages of good sledding and sleighing, this prevents the ground from becoming much frozen; and, as soon as the snow melts away in the spring, farming operations may be commenced, and vegetation progresses rapidly. With their abundance of fuel and building ma-

terials, I am satisfied that the people of Aroostook suffer less from the cold than do those who live on the seaboard many degrees further south.

In accordance with an act passed at the last session of the Maine legislature, the land agent has caused to be surveyed 10 townships of the public lands. These are offered to citizens of the United States, for settlement, in lots not exceeding 200 acres for each individual, for 50 cents per acre, payable in 1, 2, and 3 years, in labor on the roads in the township where the lots purchased lie. No cash payments are required, and the labor is to be expended in opening highways for the benefit of the settlers. This very liberal arrangement offers an excellent opportunity for our industrious and enterprising fellow-citizens to procure for themselves tracts of land without money and almost without price, on which they may soon have comfortable homes, surrounded by smiling and fruitful fields, affording a support for all their reasonable wants. I have passed through 4 or 5 of the townships designated. The most of these have mills and schools already established; and I know of no better soil, or more pleasant natural scenery, than may be found in them.

Yours respectfully,

B. F. ROBBINS.

Windham, Connecticut, December, 1850.

Sir:—In compliance with a circular from your office, I submit a few remarks in relation to the interests of farming, and very briefly. The making and application of manure lies at the foundation of all agricultural operations. The best mode of making manure, as far as I can judge from experience, is, in summer, to yard your cattle on swamp muck, turf, or loam, in sufficient quantities to absorb all the urine, and composting the solid excrements every morning. Thus the loam absorbs the volatile portions of the manure, and retains it for the use of the farm. In winter, stables should be constructed large, admitting the animals to be turned in loose, and made without a plank floor, a quantity of straw put at the bottom, where the manure is allowed to accumulate until spring. Bed down your stock every day with a sufficient amount of straw to keep them clean. The solid excrements and litter will absorb and retain the urine; and, when the mass is removed in the spring, you may safely take the evidence of your sense of smell as an assurance that your manure is of the first quality. As this mass is removed, sprinkle it freely with gypsum, and plough under as soon as possible, and you will save the volatile portion from escaping. The hog-pen should be supplied with fresh loam every day, in quantities sufficient to neutralize and keep down all unpleasant odour. A hog weighing 300 lbs., where loam is added as above, will make 10 loads of excellent manure.

Potatoes.—This is an important crop in this part of the State, it being accessible to the large markets. The rot, during the past season, has been unprecedented: they have rotted on free sandy loams, where hitherto they have been exempt; but it may be remarked, that lots highly manured have suffered most. As far as my own experience goes, I have been most successful on new lands, or land which has not been manured with barn-yard manure, but which was of sufficient fertility to bring the crop to maturity. From this it would seem that a crop of clover, buckwheat, or some other grain crop, would be the best preparation (ploughed under) for a crop of

potatoes. Fruit begins to attract the attention of the farming community in some degree, as it deserves, and, in particular, the different varieties of winter apples. The kind most esteemed here for its long keeping quality is the Roxbury Russet, which holds its flavor when other varieties become insipid. The Baldwin, Rhode Island Greening, Hubbartson, Nonesuch, Peck's Pleasant, &c. are among the leading varieties. The common error in regard to fruit trees is that they will grow anywhere and without culture. Having planted an orchard of 700 trees, within the last 4 years, I am satisfied that the growth of the trees depends mainly upon the culture given them. No orchard should be suffered to stand in a pasture or mowing lot, for the turf and grass will appropriate all the moisture in the shape of rain or dew, robbing the trees of all nourishment. The ground should be kept open, either by harrowing repeatedly or ploughing. If the latter, be very careful not to cut the roots, some of which are very near the surface. In planting, the trees should be set near the surface. The addition of a pail of water to the roots I consider to be useless, the soil, early in spring or late in fall, being sufficiently moist without such addition. I have set about 800 trees within the last 4 years, planting, both in the spring and fall, without using water, or losing any trees. I forbear to multiply topics of remark, but will take the liberty to add, in regard to the interest of the agricultural community, that what they want, to stimulate them to improvement, is a steady and reliable market for their produce. The farmer wants a home market, which can dispense with the jobber, the shipper, the wholesale dealer, &c., in order to enable him to make that improvement which the interest of our country demands.

Very respectfully,

WM. P. GATES.

Montgomery, Alabama, December 10th, 1850.

Sir:—The Agricultural Circular from the United States Patent Office, under date of 26th August, a copy of which has been sent to me, demands my attention, and I do not feel at liberty to withhold what knowledge I may possess on agricultural subjects from my fellow-citizens of a common country. Experience has taught me that it is good to stick close to old landmarks, and that nine-tenths of all experiments in our branch of industry better suits for periodicals and common talk than for profit. Improvements of real practical value are not of every-day occurrence, but are rare, and ought to be treasured up; and, if you find, in the remarks I shall make, any thing of value, I shall be glad to think I benefit my fellows. The kind of wheat best suited for this latitude is called "little white," and should be sown on the 1st of October. It does not produce largely to the acre, but makes fine flour if ground in June, so as to avoid the weevil. Rolling land, moderately rich, if a clay foundation, is best. Open prairie I do not find good for wheat. It is not a profitable crop here, on account of our frequent failures. A mixed kind of corn, of the flint and gourd-seed, is the best. We average about 30 bushels to the acre. Frequent ploughing is the best culture. The usual method of feeding corn is, unbroken and raw. I find boiling the best for hogs, and at least a fourth saving in it. The best method of manuring corn is to put the manure in the hill with the corn when you plant, and cover both together with the hoe or a good turning-plough.

We sow oats for pasture in the spring, commencing the first good weather in January. We cut some for summer feeding of horses, and the rest is fed off the land by the cattle and hogs, putting up barely enough for seeding. I have not yet seen any foreign grasses worth the culture. Indian corn, drilled thick, in rows about 3 or 4 feet apart, makes the best summer feed, or "soiling," of any thing I have ever seen.

Those who wish to raise stock on grass, better not come as low as latitude 32°, for cotton at 10 to 12½ cents per pound is much more profitable. All our planters who consult their best interests will attend to their dairies, neat cattle, sheep, hogs, and horses, for their own use, not for profit, but for saving. I am sure this section could produce sugar largely; but will not while cotton is our staple. From the tanyer, a tropical plant, to the salsify that flourishes at Green Bay, we can rear these and all intermediate sorts of vegetables: I may say as much of fruits. On the grape-culture and wine-making, I have about the same opinion that I have of grasses and cheese-making—they will not do for this country. The vicissitudes of our seasons are very great. I have known the mercury to fall 50° in 24 hours. The average of our winter weather is about 60° Fahrenheit—the range is 10° to 80°. In summer, the average is about 78°—the range from 10° to 100°. We are subject to long and heavy rains, lasting 6 weeks and more, and the same of dry weather. These great changes will account for the difficulty in raising exotic fruits or vegetables. And now let me make a closing remark. It is our best policy to improve our native plants and animals, and be less solicitous for the introduction of foreign ones; and, to succeed in this, we must be more industrious—directing and seeing to it ourselves, and not trusting to servants.

Very respectfully,

ELBERT A. HOLT.

Dennysville, Washington County, Maine, Dec. 16th, 1850.

Sir:—The following estimates, in answer to your agricultural circular, require an accompanying statement of the fact that they are given for the products of a district lying far north, the climate of which is less favorable to quantity than to quality of produce, and the soil not naturally fertile; that an average of the crops represent not so much the average productiveness of the soil as the quantity of manure and the labor and care in cultivation—the crops, except on new land, depending almost wholly on the manure; and that, as agriculture in this section of the country is, for the most part, made secondary in the pursuit to other employments, the crops are not so great, nor so economically obtained, as they would otherwise be. Therefore the estimates of actual cost here given are unduly large.

Corn.—The eight-rowed yellow Canada corn is preferred:—average produce per acre, about 35 bushels: is little raised, except in the interior, the cost being more nearly equal to its value than that of other crops raised.

Oats, Barley, Rye.—Average yield of oats, about 40 bushels per acre; of barley, 30 bushels; and of rye, 18 bushels. Quantity of seed used, 2½ bushels of oats or barley, or 1 of rye, per acre. Oats are least exhausting to the land, or, at least, they can be raised oftener on the same ground. The two-rowed barley is most in use.

Clover and Grasses.—Average quantity of hay, about 1 ton to the acre.

Red-clover, herds-grass, and brown-top are the kinds preferred. Quantity sown, 10 pounds of clover and ½ bushel of herds-grass, or herds-grass and brown-top to the acre, generally sown with grain. Meadows and pastures are usually renovated by ploughing up and manuring. Near the coast, sea-weed is used as a top-dressing with good effect. Hay can be grown for about $7 per ton.

Dairy Husbandry.—Average yearly yield of butter per cow is about 110 pounds. The climate being peculiarly favorable for butter-making, but little cheese is made—average price, 8 cents, and of butter, 20 cents per pound.

Neat Cattle.—The usual price at 3 years old is $20, and of good dairy-cows, in spring, $30; in fall, $16. Young cattle are housed for the first 3 years about 5 months in the year, and during the second and third winters, they are kept on the poorer hay. A given amount of food has been supposed to make less meat in a Durham or other large breed than in a native animal, they being smaller and hardier. Small cows are preferred as a general thing, and small oxen also, except where particular cases require heavy cattle. The native cattle will thrive where the Durhams will not—this opinion, I believe, is universally held. Whether native cattle will not gain proportionally to the amount of food consumed, when put upon the high keeping adapted to the Durham, has not been made a matter of accurate experiment to my knowledge.

Hogs are not generally raised but to consume the waste of the dairy and kitchen, and are fattened on potatoes and meal. It is thought by many that the Berkshire and some other celebrated breeds will grow faster than our native breeds, but make more lean meat—therefore are not much sought after.

Sheep and Wool.—Wool-growing for exportation is not considered profitable. The majority of small farmers keep about as many sheep as neat cattle, which goes to show that the relative profit of sheep and cows cannot be far from the proportionate expense of keeping; inasmuch as the cattle are not raised for beef, the oxen being kept only for their work. Small sheep are more profitable here than large ones. The finest Merinos are not raised here. The number of lambs annually reared will fully equal that of the ewes.

Root Crops.—Turnips, carrots, and beets. The cultivation of these as a field crop is increasing. Average crop of turnips (ruta baga) is about 700 bushels per acre.

Potatoes.—The Irish only are raised. Average crop, 250 bushels to the acre; cost to raise per bushel, 16 cents. The most prolific varieties raised here are the long red and the orange potato. The most profitable variety, and one which has nearly superseded all others, on account of the great price it bears in market, is the "white blue-nose." During the last 6 years, the potatoes have suffered so much from the rot, that their cultivation has lessened very much, and will soon be abandoned, unless a favorable change takes place.

Fruit Culture.—The culture of apples and plums is receiving increased attention.

Manures.—Lime has been tried at various times and in various places; but, so far as I can learn, without effect. Plaster is sometimes beneficial, though little used.

Very respectfully, your obedient servant,

THOMAS LINCOLN.

METEOROLOGY.

The subjoined notes have been taken from a register of the weather which has been kept for 35 years without interruption. This register has been kept at such a distance from the ocean as to be only slightly affected by it. The thermometer rises a little higher and falls a little lower in the interior than here. A record of two observations per day only has been kept; but it is believed to be essentially correct.

Mean Temperature.

Months.	1845.	1846.	1847.	1848.	1849.	1850.
January	21.5	18.	Omitted	25.2	14.4	22.5
February	21.	13.3	by	25.	13.7	25.7
March	28.1	31.5	accident.	31.5	30.7	27.2
April	39.5	44.1		39.2	40.	37.5
May	51.4	51.6		52.8	50.	50.
June	62.	62.		60.	62.7	62.
July	64.	67.		66.	67.2	66.5
August	65.8	64.8		66.4	65.4	63.5
September	51.7	58.6		56.2	57.1	58.5
October	47.6	44.5		46.8	47.	50.4
November	41.2	38.		35.2	41.5	37.8
December	18.6	23.7		28.2	22.5	
Highest range	June 9th. 90° above.	July 11th. 96°	July 10th. 93°	June 23d. 86°	July 13th. 98°	June 20th. 96°
Lowest range	Jan. 15th. 16° below.	Feb. 11th. 20°	Feb. 1st. 14°	Jan. 12th. 13°	Feb. 14th. 35°	Feb. 6th. 20°

Mean Temperature of each Year for Thirty-four Years.

Years.	Degrees.	Years.	Degrees.	Years.	Degrees.	Years.	Degrees.
1816	40.8	1825	43.8	1833	41.2	1842	42.6
1817	41.	1826	41.1	1834	41.5	1843	42.3
1818	41.6	1827	41.9	1835	41.	1844	42.2
1819	43.6	1828	44.3	1836	40.6	1845	42.6
1820	41.5	1829	42.1	1837	40.4	1846	43.1
1821	41.4	1830	43.9	1838	41.6	1847	43.7
1822	42.1	1831	43.7	1839	42.6	1848	44.5
1823	41.1	1832	40.7	1840	42.7	1849	42.7
1824	42.6			1841	43.1		

REMARK.—Mean temperature for thirty-four years, 42° 2′.

Depth of Rain and Snow for the Years 1849 *and* 1850.

Months.	1849.		1850.		Remarks.
	Rain.	Snow.	Rain.	Snow.	
January	½	5	2½	25½	The quantity of rain is not given as entirely accurate, but as a near approximation. These two were seasons of very unusual drought.
February	...	7	3	10	
March	2	3½	1½	19	
April	½	1½	3	13½	
May	1¾	...	6½	...	
June	1¼	...	2¾	...	
July	1	...	1½	...	
August	2	...	4½	...	
September	4¾	...	4½	...	
October	3½	...	5	...	
November.....	3	½	2	3	
December	1½	16	...	...	
Aggregate.....	21¾	33½	36¼	71	Up to December.

THOMAS LINCOLN.

Byberry, Philadelphia County, 12 *mo.* 3*d,* 1850.

Sir :—I proceed to give answers to some of the questions in your circular, sent me, calling for agricultural statistics for the year 1850. But as there is a large and efficient agricultural society in the county, (which appears to me to be the most reliable source of information,) my answers will be quite brief.

The wheat crop promised very fair while growing, but was very much injured by (what is here termed) the grain worm, a small insect which feeds upon the grain while in a soft or milky state. The varieties of wheat that have matured early have, as yet, escaped the new enemy, consequently the Mediterranean wheat is now almost universally sown. The quantity of seed sown is 2 bushels per acre, and the average yield is about 20 bushels per acre. The time of seeding is from the middle of September to the 1st of October, and of harvesting, the early part of July.

The average price this year has been $1.10 per bushel.

Corn.—This is an important staple, a good crop of which has been harvested say from 50 to 80 bushels per acre. The most esteemed varieties are a mixture of the gourd-seed and Cooper corn, and the gourd-seed, the former of which I think preferable. Corn is generally planted on timothy-sod, ploughed in the spring about 5 inches deep, and planted about the 1st of May, and worked principally with the cultivator and hoe.

Broom corn is extensively cultivated, and is generally planted after Indian corn. The average produce is 300 brooms and 30 bushels of seed per acre, worth, in the rough, $40. The brooms are principally manufactured by the cultivators of the corn, during the winter season. It is considered a profitable crop in this vicinity.

Oats are generally sown after corn,—about 3 bushels of seed, with an

average yield of 40 bushels per acre. They are generally sown as soon as possible after the frost leaves the ground in the spring. The price this year has been higher than usual, being from 40 to 45 cents per bushel.

Clover and timothy are both sown with wheat. The quantity of hay is from 1 to 2½ tons per acre. The price this season has been about $13 per ton.

The dairy business is not very extensively carried on, although most farmers make some butter to sell. The average yearly produce of butter from one cow is about 200 lbs., worth about 20 cents per pound. It is generally taken to market while fresh, in lumps of one pound each. The usual price of a good dairy-cow, 3 years old, is about $30.

Very few sheep are kept for their wool, as it is impossible to compete with the great West in this particular. The Southdown breed is considered the most valuable. There are but few flocks of this kind in the county. Large numbers of common sheep are purchased from droves, in the fall, and are fed during the winter season.

Hogs.—The best breeds are the Berkshire and Chester county. They are much raised for market, but are principally kept to consume the offal about the farm. They usually weigh, at one year old, if well fatted, about 300 lbs.

Of the turnip kind, the ruta baga, or Swedish turnip, is by far the most valuable, though very little cultivated. Flat turnips are frequently sown among corn at its last dressing, or after early potatoes, and often yield from 200 to 400 bushels to the acre. The ruta bagas are planted upon ridges three feet distant about the first of July, and worked with plough and hoe. If properly cultivated, they frequently yield 600 to 800 bushels per acre. They are the best food for cattle of all the root kind.

Potatoes have become such an uncertain crop that many farmers have relinquished their cultivation. They have been more affected with the rot the past season than in any former one, and no remedy has yet been discovered. The most common variety is the Mercer. It also finds the most ready sale in the market.

Manure.—The main source of manure is the barn-yard, where the straw, cornstalks, and refuse of all kind are collected. Many farmers feed cattle during the winter, which helps to increase their stock of manure. Compost is often made of swamp-muck, loam, &c., mixed with lime, plaster, salt, &c. Lime is used in considerable quantities, and is generally applied on wheat stubble at the rate of 40 bushels to the acre. Plaster, or gypsum, is universally sown on clover fields in the spring, when the grass is about 4 inches high, at the rate of one bushel per acre, with most astonishing effect. It is a valuable agent in absorbing manures in the form of gases, and is used very profusely about manure-heaps, cattle-yard, and stables. Its action is just the reverse of lime, the one retaining the gases and the other assisting them to pass off. Guano has been used in small quantities, and with good effect, but the high price prevents its coming into general use.

JAMES THORNTON, JR.

Richmond, Massachusetts, January 24, 1851.

Sir:—Your circular was duly received, and should have been replied to long ago, but unavoidable circumstances prevented my giving that atten-

tion to the subjects upon which it invited remarks, seasonably to address you before the present time.

As the seasons have much to do with the failure or success of agricultural labors, I remark first, that the months of December, 1849, and January, 1850, were of a mild and even temperature; so much so that the branches and buds of the peach and apricot looked nearly as well when they were past as when they commenced. During these months the ground was nearly free from frost, and during the greater part of the time was protected by several inches of snow. March was a cool, windy month, and although it thawed much nearly every day, it froze hard nearly every night. The consequence was that the branches of peach-trees soon began to exhibit at their extremities indications of shrivelling, which continued through the month, so that one-half or three-fourths of the previous year's growth in many situations were destroyed. It is not to be wondered at that many of the buds on the live part of the branches should be destroyed too, under these circumstances. April and May were cool. There were many cloudy days in both months, and much storm, so that the labors of spring were retarded, and many thought if it continued so it would not be much of a corn year. June, and until the middle of July, were warmer and drier, so that by the first of July vegetation had advanced to about its usual position at that time. From the 15th of July forward, there was much rain, and some sweeping winds, whose effects upon the grain were any thing but favorable to rapid harvesting. Thus much for the season.

Wheat.—Winter wheat is rarely sown in this region. Spring wheat has gradually been receiving more attention, but the last crop was an unfortunate one—not indeed half a crop. That was probably owing in some measure to the fact that the season of its filling was very wet. It suffered some from the fly, but the straw was unusually bright, and the empty heads stood erect. Spring wheat is usually raised after some hard crop, for which the land is well matured. It has usually but one ploughing at the time of sowing, which varies in depth according to the notions of farmers and the character of the soil. The importance of deep ploughing is now better understood than formerly, and farmers are practising accordingly. We are not troubled with the Hessian-fly. The best remedy for the weevil that I know of is to sow gypsum over the wheat while it is in blossom. This insect does its work while the berry is soft, and the plaster sown at this time operates as a stimulant to hasten its maturity and carry it beyond the insect's reach.

Corn.—Almost every farmer has his favorite variety. The early Dutton is probably as productive as any, though some prefer an eight-rowed variety with large kernels, growing more loosely on the cob, for its still earlier maturity. The crop of the last season was good, though many circumstances in its growth were unfavorable. The yield, of course, was as various as the soils on which it grew or the skill of the cultivator. Forty bushels to the acre were, perhaps, a fair average last season. The cost of producing a bushel of corn depends upon circumstances. An intelligent and successful farmer who never fails with his crop, and whose average produce is seventy bushels per acre, told me that it did not cost him over six cents a bushel to raise his corn. He estimated that the tops and shucks would pay for the labor, and that the increased productiveness of the land would pay for the manure. But all farmers have not his favorable soil. The process of cultivation varies with different persons. We think a very

successful one to be to plough sward-land deep, and lay the furrow flat but a few days before planting. We say lay a flat furrow that the sod may not interfere with cultivation, and we would have the ploughing recent that the grass may not start up between the furrows, and for the reason that the later a clayey soil is ploughed in the spring the more friable it will be, and of course better adapted to the growth of roots. The ground is then thoroughly harrowed and struck out in rows for planting. Manuring in the hill is an almost universal practice, and from six to eight loads are applied to the acre. Farmers who can afford it use rotted manure of the previous year. Ashes and plaster are used as top-dressings.

Oats, Barley, Rye, Buckwheat, Peas, and Beans.—Oats and buckwheat are more generally raised than the other crops. The former because they are subject to but few accidents, and the latter because it will admit of a later sowing than other crops. Oats are an exhausting crop, but they command a ready market at an average of forty cents for thirty pounds. Buckwheat is a cleansing crop. From its rapid growth and shady habits it chokes weeds, which often overrun old fields, and one or two crops usually eradicate them. It is well adapted to low moist lands where other ploughed crops would fail, and its yield on such land is usually greater than on dry soils, like rye, of which but little is raised, and barley, which is not a very common crop it is good to stock after.

Potatoes.—The early part of the season being cool and wet, the expectation of farmers was that this crop would succeed well; consequently, larger quantities were planted than usual. The crop, however, has never been so near a total failure before. The rot commenced in July, earlier by some days than ever known before. Every variety, the earliest and most hardy, suffered more or less from its ravages. Peach-blows and some of the coarser varieties suffered least—and those more delicate, the most. A great proportion of the fields yielded no more than the seed, and in many instances the failure was so great that whole fields were left undug. Where they escaped the rot, the quality was poor and probably unhealthy. In consequence of the oft-repeated failure of the potato crop, other root crops, such as turnips, carrots, and beets, are receiving more general attention. In the culture of turnips, a piece of sward-land is turned over very flat in July, over which a dressing of well-rotted manure is applied, after which the ground is thoroughly harrowed. The seed is sown broadcast from the 10th to the 20th of July, and covered with a light harrow or bush. Soon after the plant appears, a dressing of ashes is applied, and the labor is done till the time of digging. The yield varies from 100 to 200 bushels per acre, and the uniform price of good turnips in the fall is 25 cents per bushel. A variety known as the cabbage turnip is coming into repute. In form it resembles the ruta baga, and in taste it has somewhat the flavor of a cabbage. Its productiveness is great, and its keeping qualities are beyond a question, it being, if possible, more tender in March and April than in November, and retaining its good qualities until June. They are easily raised, and are worthy of commendation to general cultivation. It endures the winter with only a slight protection, and will grow where other root crops will succeed.

Yours truly,

W. BACON.

Kalamazoo, Michigan, December, 1850.

Sir:—In answer to your circular of 26th August, 1850, I would say:—

Wheat.—Soule, Blue-stem, White-flint, Red-chaff, and Bald are varieties most in use, and preferred in the order I have placed them. A new variety called white-chaff blue-stem is said to have come from your office, and is much esteemed where it is known; average yield the past season, 20 bushels per acre in this county; time of seeding, from 1st to 20th September, and of harvesting, about the middle of July. Quantity of seed, one bushel and a peck per acre: plough twice, about six inches deep. The yield per acre is on the decrease. Our rotation of crops, is, wheat after wheat, every other year. The average price for the past season, 65 cents per bushel.

Corn.—Yellow-dent, two-thirds, and white-dent, one-third; product, 40 bushels per acre; cost of raising, 6 to 10 cents per bushel; tillage done by small plough and cultivator, once each. Corn is mostly used on the cob in feeding.

Oats.—White oats preferred; yield on prairie land, 50 bushels, and on oak openings, about 20 bushels per acre; price, this season, 20 cents per bushel.

Barley not much raised.

Rye, *Peas*, and *Beans.*—Seldom seen in cultivation.

Clover.—The medium size preferred; produces one and a half tons per acre, with the use of plaster. Other grasses are not much known.

Dairy Husbandry.—No surplus in the county.

Cattle.—Value: calves 8 months old, $3; yearlings, $5; two years old, $8, and three years old, $10 to $14. Good cows, $12 to $20. Sheep are profitable and largely on the increase, but I am not able to reply to other inquiries.

Hogs.—We have a variety of crosses of all kinds, and the quantity of pork is on the decrease in this county, and I may say in this part of the State.

Tobacco does well, and matures before frost affects it, though now raised in small quantities. I think that a few years hence it will be next to wheat among our surplus crops.

Hemp.—Not raised.

Turnips, *Carrots*, and *Beets.*—Not cultivated in the field.

Potatoes.—Many varieties; cultivation much neglected; product, 100 bushels per acre; cost of raising, about 5 cents per bushel. Sweet potatoes do well; raised only in small quantities, on account of scarcity of seed, for we do not know how to keep them.

Fruit does well, and is of excellent quality; a great deal of attention is being paid to all kinds—also to grapes. This section of the State is of recent settlement, and it is only within a few years that a supply of trees could be procured at a reasonable cost, and the orchards are yet quite young; but a few years will give a large surplus of excellent grafted fruit.

Manures are almost wholly neglected, except plaster, which is used some on corn, and much on clover, at the rate of 60 pounds per acre, every spring soon after snow is gone. This section of the State is increasing in the culture of corn, and rather on the decrease in other grains, owing, I think, to the yield being less, arising from the soil being run hard, and neglect to manure; but more attention is being paid to a regular system of farming, and of applying the means to keep the soil in good heart.

The circulation of agricultural papers is producing much good, by stimulating the farmers to greater efforts, and in applying the recent improvements and labor-saving machines to carry out the work. One hundred copies of your Patent Office Report, in this county, would do much good, and I have made quite an effort to get a copy, but without success as yet through Lewis Cass of the Senate, and William Sprague of the House.

Yours, respectfully,

WM. L. BOOTH.

URTICA WHITLOWI.—SUBSTITUTE FOR HEMP.

Townsend, Huron County, Ohio, January 30th, 1850.

Sir:—In looking over the Patent Office Report for 1847, I find, on page 163, under the article *Hemp*, an extract from Niles's Register, vol. 3, page 188, referring to the plant *Urtica Whitlowi*, discovered by Charles Whitlow, of New York. The plant alluded to underwent, at the time of its discovery, a very critical examination as to its merits and adaptation to the purposes of hemp and flax, by the persons or committees appointed for the purpose, and whose investigations were in accordance with the remarks contained in the Register.

Now, perhaps, some light may be thrown on this subject. I was well acquainted with Mr. Whitlow, and have seen the plant, together with a piece of the cloth manufactured from it, which was remarkable for its white and silk-like appearance, and also for its uncommon strength. Mr. Whitlow informed me, that General Macon, then a Representative in Congress, remarked that "the discovery was worth the whole contents of the Patent Office;" but this of course will go for just what it is worth.

The reason why no further experiments were made to test its utility was this:—Mr. Whitlow was making preparations to fallow for following it up on an extensive scale, but unfortunately death put an end to any attempt on his part to bring about the anticipated result. The fact that Mr. W. was a foreigner, (a Scotchman by birth,) and that he had but few friends in this country, and none who felt an interest in the speculation, will account for the abandonment of the enterprise.

But I think a knowledge of the plant may be reclaimed, if it has been lost, which seems to be intimated in the Report. I will attempt to give a description of it; but it is merely from recollection, and may be erroneous. The plants have radical stems, or rather they may be said to be all radical, as there are many springing directly from the root. Smooth or glabrous, or dark purplish red, or dark mahogany color, the leaf lanceolate, serrate, acuminate, sessile; but I am not certain, nor am I botanist enough to determine whether it is necessary that a plant should be pubescent or hirsute in order to constitute it a species of *urtica*. Be this as it may, I think I should recognise the plant if I should see it again. Mr. Whitlow informed me that he discovered it a few miles from the city of New York, on some of the moist grounds so common on the island. I have troubled you with these remarks more for the purpose of eliciting further research than with any other design. Should I visit New York the present year, I intend to make inquiries in order to discover what was thought to be of such immense value. Should I succeed, information will be duly commu-

nicated. I will add that if you should think it necessary to ask any questions relative to the above facts, or that will throw any more light upon the subject, as far as I am able, they will be given with the greatest pleasure.

Respectfully, your obedient servant,
BENJAMIN BENSON.

Hon. T. EWBANK,
Commissioner of Patents.

Remarks.—A space is given to the above as a matter of some interest to the public.

The family of plants to which the *Urtica Yucca* referred to belongs, flourishes principally in the Southern States, where it has attracted some attention from its textile properties. Its fibre, however, is not so strong as that of hemp.—ED.

Searsmont, Waldo County, Maine, January 6th, 1851.

Sir:—In answer to your circular, I submit the following:—

Wheat.—The variety used here is the Red Sea, so called here, and is preferred because it is less liable to be troubled by weevil, and matures about 15 days earlier than any other, and produces more grain; but the flour is not so good as that of another variety, called bald wheat. Average product, about 12 bushels per acre. We plough twice, about 5 inches deep, and harrow well, then roll or brush the ground. The yield was better the past year than for 4 or 5 previous years. Rotation in crops is almost universal. We know of no remedy for the weevil. If the Hessian-fly troubles our wheat, we do not know it. The average price is about $1.50 per bushel. We have not sowed any other than spring wheat till within the two past years, when a few farmers have tried the white winter wheat and have succeeded well.

Corn.—The most esteemed varieties are the 8 and 12-rowed yellow, which will mature in about 3½ months from the time of planting. Average product, about 30 bushels per acre. Cost of production, say 65 cents per bushel. The most approved method is to plant upon ground that had been broken up the year before, plough twice, and spread on all the manure we have to spare for that purpose, say about 25 cart-loads to the acre; furrow it out about 5 feet apart, and manure in the furrows with well-rotted manure, and drop the seed in drills about 3 inches apart, and cover with the hoe. When the corn comes up, sow on unleached ashes and hoe it sufficiently to keep down all weeds, but not hill it up nor use a plough between the rows. The cultivator is the best, and not so liable to cut the roots as the plough. The seed, before planting, should be soaked in a solution of saltpetre or copperas, and stir in some warm tar, then dry with lime. We think this will prevent the worms, crows, and birds from eating it. We believe at least 25 per cent. is gained by grinding corn, and 15 per cent. more by boiling the meal. The next inquiry I cannot answer to my own satisfaction, never having known of an experiment of the kind, but am well satisfied that the value of the manure produced would be much more than is generally supposed. The average crop of oats is about 25 bushels per acre, and of barley, about 15 bushels; rye, 25 bushels; peas, 10 bushels; and beans, about 15 bushels per acre. The quantity of seed used is as follows, viz.

oats, 3 bushels; barley, 2 bushels; rye, 1 bushel; peas, 2 bushels; and beans, 1 bushel per acre. I think peas are the least exhausting to the land.

Clover and Grasses.—Average crop, about 18 cwt. to the acre. The grass seeds preferred for laying down meadows are red-top, tall meadow, and herdsgrass.

Dairy Husbandry.—The average annual product of butter and cheese per cow is about $20. The price of butter is about 15 cents per pound, and of cheese 10 cents per pound. The cost of rearing neat cattle in this State is all that they will sell for, which is about $25 per head. The price of good cows is about $25 each in the spring and $13 in the fall. The Durham, Devon, or Hereford are a decided improvement upon our native stock for every purpose.

Sheep and Wool.—We think the rearing of sheep more profitable than that of any other stock at this time. Large sheep are supposed to be the most profitable both for fleece and mutton. The proportion of lambs reared to the ewes is about four-fifths.

Hogs.—The most approved breed is a cross of the Newbury white and Tuscarora. The usual, and probably the cheapest, way of raising and fattening pork in this State is to feed with boiled potatoes, turnips, and pumpkins, mixed with meal and milk, and, a short time before slaughtering, to give them (the hogs) boiled meal either of corn, oats, peas, or barley, or of meal from corn ground in the ear, which last we have used as a substitute for potatoes for the last 2 or 3 years. Our method is to first crack the ears in what is called a corn-cracker, and then grind in a grist-mill. We learn, from experiments made, that the nutriment contained in 30 lbs. of corn-cobs is equal to 23 lbs. of oats, which weigh 30 lbs. to the bushel. This we believe from experience. The miller takes 3 quarts per bushel for cracking and grinding, instead of 2 quarts for grinding the corn alone. For this extra quart we get our corn shelled, (or, rather, are spared the trouble of shelling,) and save the nutriment of the cob. This meal makes excellent feed for horses and cattle. I do not think it profitable here to make pork by feeding on clear corn.

Root Crops.—We consider the cultivation of the ruta baga as one of our most profitable crops, and which is rapidly increasing. The cultivation of the largest crop within my knowledge was as follows, viz. :—The land was planted the year before with potatoes; the next year the ground was ploughed, and 40 loads of manure and 10 loads of leached ashes were spread to the acre; then a deep furrow was ploughed, and two furrows turned into that, which would leave the land in ridges. Drop the seed on the ridge and rake in, then roll with a horse-roller. When the plants appear, we thin them out, that they may stand 3 inches apart all over the ridge. This mode of planting will make the rows about 2½ feet apart. I have known the produce of an acre thus served to exceed a thousand bushels. The usual crop is, I suppose, about 700 bushels. Carrots and beets are not thought to be profitable crops.

Potatoes.—We do not raise any sweet potatoes, and comparatively few of any kind for the last four or five years. We, probably, cultivate 20 different varieties of Irish potatoes, and consider the long red to be the most prolific, though not so good for the table as the white and blue varieties. We plant on new land, preparatory to other crops. I think the best method is to manure the land and plant them in drills about 3 inches apart. The large

ons should be cut. We usually hoe but once. Average crop, about 150 bushels to the acre; but before the disease affected them, our average was about 400 bushels per acre. Then we could make it profitable to raise them for 10 cents per bushel.

Fruit Culture.—The cultivation of fruit is increasing in this State; especially the apple. I think, if the apple should continue to flourish as it has for the last 10 years, it will be a very profitable crop. Thirty-four years ago, I planted 500 apple-trees. None of them, nor of the second crop, and only two of the third crop, are now alive, but I have continued to replace them as they have died, and I now have a very flourishing orchard, which I find to be profitable. The price of apples here is from 33 cents to $1.25 per bushel. We do not think it profitable to feed apples to hogs. It has not been profitable, in this part of the State, to rear apple-trees, until within the past few years. Russets are the best kinds to keep for winter.

Manures.—The best plan for making manure, we think, is to cart into our hog and barn-yards swamp-muck in the spring, and in the fall draw it into the field for use the next spring, and, before using, mix with lime. To preserve manure from waste is to cover it up as soon as applied to the land. The above are correct answers to a part of your questions, according to the best of my judgment.

Very respectfully, yours, &c.

HARRY HAZELTINE.

Scottsville, Monroe County, N. Y., January 14th, 1851.

Sir:—The circular issued by you from the U. S. Patent Office has been received by me, and the following are answers to the questions therein contained, so far as I am practically acquainted with the subjects upon which information is desired. The town of Wheatland lies on the Genesee River, in the very heart of the great wheat-growing region of Western New York, and possesses, in its soil and climate, in an eminent degree, those essential characteristics which have rendered Genesee wheat and flour so famous.

Wheat is the great staple article of produce both of this and all the adjoining towns, to which all other branches of farming are subservient. The varieties chiefly cultivated here are the white flint and Soule. The white flint was introduced here about 25 years ago, and quickly superseded all the kinds then in use, and still continues to be a favorite with most farmers. Its characteristics are, singular hardiness of constitution, which renders it less liable to damage while growing than any other variety now grown, and less liable to be destroyed by the various depredatory insects which infest this crop. It is also an excellent wheat for flouring purposes, making a large quantity, per bushel, of the richest and whitest flour. The Soule is of more recent introduction, not having come into any considerable degree of favor till within the last five or six years. This variety of wheat, as generally raised, consists of two kinds, a white and a red chaff, very similar in their habits of growth, and appearance after being threshed; so much so, that it is very difficult to distinguish them. It is a less hardy wheat than the white flint, the growth of straw is much less, and it is about a week earlier in ripening. The probability is, that it will not make so much flour per bushel as the flint, but it is of excellent quality. The Mediterranean variety has been introduced here from Maryland and Pennsylvania lately.

It is a coarse, hardy wheat, but not fit to be raised on the fine wheat-growing lands of Western New York. It will not make superfine Genesee flour, and its introduction here would destroy the high character that flour has hitherto sustained. The average product per acre for this town, according to the last State census, was 22 bushels, and was the highest in the State. The yield has undoubtedly increased since that time, and will now probably range as high as 25 bushels. Many farmers get better averages than that. Our seeding-time is from the 10th to the 25th of September, and our harvest from the 15th to the 25th of July. The general practice is to sow good clean seed, without any preparation, at the rate of from 5 pecks to 2 bushels per acre. Our usual manner of cultivation is to sow on summer fallow, ploughed two or three times; though it is becoming common to plough but once, the after-cultivation being done with the harrow and cultivator. The depth of ploughing varies from 5 to 10 inches. Our yield per acre has undoubtedly been increasing, ever since the settlement of the town. The most common rotation is to sow wheat every other year upon a clover lea, pasturing or mowing one year out of the three. As to remedies for the Hessian-fly and weevil, I know of none. The fly, of itself alone, in my opinion, is very rarely the cause of the destruction of a crop of wheat, but, when combined with other causes, it often finishes what they have begun. The average price of wheat at our mill in Scottsville, has been $1.03 per bushel.

Corn is cultivated here to a considerable extent, and its cultivation is on the increase. The most esteemed varieties are the Dutton, eight-rowed yellow, red blaze, and white flint. The average product per acre varies very much, some farmers getting 50 bushels, and others only 25 bushels per acre. It would be, however, not far from 30 bushels. The lowest cost to produce an acre is not less than $12, including interest of land and taxes, which, at an average of 30 bushels per acre, would be 40 cents per bushel. Thirty bushels of corn at 50 cents would be $15, stalks worth $3, which would leave a net profit of $6 per acre. My crop has averaged, for the last 8 years, 45 bushels per acre, including 1 year of almost total failure from severe drought. My practice is to raise corn on a clover lea manured with about 16 loads of good barnyard manure to the acre, ploughed in deep. I plant in hills, about 3 feet apart each way, about the 20th of May; the after culture is almost wholly done with the plough and cultivator. The whole expense would not exceed $14 per acre; so my net profit would be about $12 per acre. The best mode of feeding corn to hogs is, in estimation, to give it to them raw and unground, and for cattle raw, but ground. I do not think the increased value of the feed will pay for the labor and expense of grinding and cooking. As to the increased quantity of grain per acre that the manure of 10 bushels of corn consumed by hogs would make, I cannot say; but think it might be from 2 to 3 bushels.

Oats are only raised here in small quantities; many farmers not producing any. The average product per acre would not exceed 30 bushels.

Barley.—The cultivation of this grain is increasing. Average per acre, about 25 bushels.

Rye is not raised here at all.

Peas and *Beans* are raised only in small quantities; they do not average more than 20 bushels per acre.

Clover is chiefly cultivated in this town for pasturage and hay. Average per acre, about 2 tons. Gypsum is the only fertilizer used here for pasture

and meadow. Clover and timothy are the only grasses used here for seeding meadows; quantity of seed sown per acre is from 6 to 8 lbs. of clover, and from 6 to 8 quarts of timothy. The cost of growing hay per ton will not exceed $3. The price it now brings is $12 per ton.

Dairy business is not pursued here as a means of profit; farmers generally producing merely enough of the dairy products for family use.

Neat Cattle are raised by most farmers to some extent, and are mostly fed on rough fodder, such as straw, corn-stalks, &c. The cost of raising till 3 years old in this way is but trifling, as they consume but little which would be valuable for other purposes; and the manure they make is worth quite a portion of the cost of their keeping. Average price at that age, from $25 to $30. A given amount of feed will produce more meat in a Durham or Devon than in a native animal. I am not acquainted with the Herefords.

Sheep husbandry is profitable here. The cost of growing coarse wool is greater than that of fine. Some of the coarse breeds were introduced here some years ago; but, after trial, they were universally abandoned. Many good flocks of fine-woolled sheep will average from 4 to 5 pounds per head. The cost of production is small; as, like cattle, they are fed on what would be otherwise wasted. The lambs, from a well-managed flock of sheep, will pay nearly all expenses. The Merino sheep are the most profitable, both for mutton and wool. The proportion of lambs annually reared to the ewes will not exceed one-half.

Hogs are raised by every farmer; but pork, as an article for market, will seldom pay. The best breeds are grade animals, produced by a cross of the China with some of our larger breeds, such as the Leicester and Byfield. One hundred pounds of corn fed to good hogs will produce 10 pounds of meat. We put down our pork in salt, using nothing else.

It is gratifying to be able to say that a better system of farming is taking the place of the old, careless, and slovenly method heretofore practised in Western New York. This is to be attributed chiefly to the liberal prices obtained for our produce for the last few years, thereby producing in the farmer a stimulus to exertion, which he does not often feel when prices are so low as barely to pay the cost of production. Give us a market and remunerating prices, and we can raise an amount of produce that will astonish the world.

I am, sir, yours very respectfully,

SAMUEL WOOD

THE TEASEL, AND ITS CULTIVATION.

Paris Hill, Oneida County, N. Y., December 26th, 1850.

THOMAS EWBANK, Esq.:

Dear Sir:—I had designed writing an extended communication, including a reply to several interrogatories contained in your Agricultural Circular, bearing date the 26th August last, a copy of which was forwarded to me: on reflection, however, I have concluded to confine my remarks to one subject, having reference to a branch of agriculture pursued to some extent in this State, as well as in a portion of New England, and which is not included in

your list of inquiries. I refer now to the cultivation of *teasels*—an article of agricultural production of some importance, not embraced in the census returns, and of which, consequently, no reliable statistics can be obtained as to the quantity or value of the annual product. My present purpose is principally to call the attention of others to the subject, hoping some one more competent will be disposed hereafter to do it better justice.

The teasel is a biennial plant, found in the north temperate zone between the latitudes of 40° and 44° in the United States, and cultivated also in England, France, and Germany. The bulb or ball of the plant is the only part of it which is of any value, and that is highly useful, and, indeed, necessary in the manufacture of cloths and other woollen goods, being found far superior to any thing else for the purpose of raising and laying the nap, thereby enabling the manufacturer to give his goods a more perfect finish. In fact, although a great variety of experiments have been tried with other materials as substitutes, nothing has as yet been discovered that would answer the purpose equally as well; the flexible hooks of the teasel being admirably adapted to the purpose, and, with proper precaution, not injuring the texture of the goods upon which they are used.

There are several varieties of the teasel. Some of these grow spontaneously in the Northern States in old meadows, and by the roadside, and, in soils favorable to their growth, become sometimes difficult to eradicate, and are reckoned among the noxious plants. They attain a height of from 4 to 6 feet, and are in full bloom in this latitude in the latter part of August, bearing a purplish blossom. The head, being furnished with long, flexible, but perfectly straight prongs or spires, has never yet been found of value for any purpose. These varieties are therefore never cultivated.

The cultivated varieties, although distinct from each other, yet being similar in their general character, and requiring the same mode of cultivation, it is not necessary in this article to speak of them otherwise than generally. At what time the cultivation of the teasel commenced, or when and by whom it was introduced into the United States, I have not at hand the means of ascertaining. In the infancy of our woollen manufactures, however, it was cultivated only in gardens and small plantations, and that to a very limited extent. The cultivation, however, increased with the demand caused by the increase of our manufactures; but it was not until the year 1820 that it was known as an article of field culture among agriculturists. The supply being seldom equal to the demand, till within some 12 or 15 years, the deficiency was made up by importations from Europe: with the increase of the manufacture of woollen goods, however, there has been an increased cultivation of the teasel; and as the nature and wants of the plant have been more closely studied, and its cultivation better understood, there has been a corresponding decrease in the price, without materially diminishing the profits of the producer. The first grown in this country were sold, it is believed, as high as $10 per thousand; and as late as 1835, teasels were imported at a cost of from $4 to $5 per thousand. Since that time, there has been a gradual reduction of the price in market, until within the last 5 years, within which time it is believed they have reached their minimum price, being sold as low as 75 cents to $1 per thousand.

As no census has been taken of the quantity annually produced at the present time, no correct estimate can be made: any attempt at such an estimate must necessarily be only an approximation. It is to be hoped that hereafter teasels will be included with the other agricultural products in

relation to which the various marshals and their assistants will be required to make inquiries, and report in their census returns, both as to the product and value. The benefits resulting from such a course can be properly appreciated by those who are fully aware of the importance of the article to the manufacturers, and as a substitute for which, no other production, either of nature or of the ingenuity of man, has yet been found *suitable*.

With these preliminary remarks, we will now proceed to give some directions (founded on experience) of the proper mode of cultivation of the teasel. And first, of the *soil*:—The teasel, being taprooted, requires a deep, rich soil. A strong, gravelly loam, if of sufficient depth, is found generally preferable—the teasels grown on such a soil being more durable in use, and the roots of the plant being less liable to be thrown out during the severe frosts of winter, which on many soils is frequently the cause of great loss. As a preventive of this evil, sward-land, ploughed deep, and well turned under, in April, is to be preferred. A subsoil plough will be found highly beneficial in giving a good depth, and preparing the soil in such manner as to enable the main root of the plant to penetrate freely, and to a sufficient depth to insure a vigorous growth. After ploughing, the surface should be thoroughly pulverized, and made as smooth and even as possible, by harrowing, or other suitable means. This will not only be of great benefit to the young plants, but will facilitate the after culture.

Planting.—This should be done in the month of April, or as nearly as possible in May; it being highly important that the plant should be well rooted before the coming on of the hot, dry season of midsummer. Another advantage in early planting is to enable the plant to attain sufficient maturity by the first season to insure its forming the stalk the second year, which small, late plants are likely to fail in doing, and, consequently, are a loss. The ground being properly marked out in rows, one way only, the seed may be sown in drills, by hand, or, more conveniently, with a drill-harrow adapted to the purpose, the drills being from 3 to 3½ feet apart. The latter distance is perhaps more suitable when the land can be afforded for the purpose, as giving a more convenient distance for working between the rows, especially in harvesting the crop. The seed should be but slightly covered. This may be done with a hand-rake, or more expeditiously with a light wooden drag, drawn by a horse, and following directly on the rows. Six quarts of seed, if properly distributed, is a sufficient quantity for an acre of ground.

Hoeing.—The seed being sown, no further attention is requisite till the plants are of sufficient size to admit of weeding, which will generally be between the 1st and middle of June, if the seed was put in early. As the plant in its earliest stages is a very slow grower, it will be necessary, unless the ground is quite clean, that the weeding should be done while the plants are yet quite small; otherwise there will be danger that the weeds will overtop them, and the after culture be likewise greatly increased. Usually, the hoe and the fingers are the only implements that can be used to advantage at this stage: the most important part of the work consisting in cutting or pulling up all the weeds in or adjacent to the row, and dressing down the plants into as narrow a row as is practicable, and thinning in the row to a distance of from 4 to 6 inches. Little or no earth should be thrown around the plants at the time of weeding.

The *hoeing* should principally be done about a month after the weeding—say from the 1st to the 10th of July. The plants by this time will have at-

tained sufficient size to allow a cultivator to be used between the rows, and a portion of the earth may be drawn lightly around the plants with a hoe, thinning them at the same time, as they may require, to a distance of from 6 to 8 inches in the row. After this, if the work has been faithfully performed, but little further attention will be requisite the first season, other than to keep the ground mellow, by passing through between the rows occasionally with the horse-hoe or cultivator. The ground, however, should be kept perfectly clean and free from grass or weeds, and if this cannot be done without, another hoeing will be necessary, say in August.

As early in the spring of the second season as is convenient, or as soon as the ground is sufficiently dry to work properly, go through the piece again with the cultivator. Follow with the hoe, and give the plants another light dressing of earth. If the ground has been well tilled, as the plants will now commence forming the stalk, and will soon thoroughly shade the ground, but little further cultivation will be required. Should any weeds or thistles show themselves, remove them with a hoe or with the hand, but avoid working the ground to any depth, as, by disturbing the numerous fibrous roots now shooting out near the surface in every direction, the plants may be seriously injured.

Soon after vegetation has started freely in the spring, the stalk of the plant manifests itself, shooting upward, and attaining nearly its full height about the first of July, by which time the burs or balls of the earliest teasels will be visible. The plants attain to various heights, according as circumstances are more or less favorable to their growth, say from 4 to 8 or 9 feet, with several branches shooting out from the sides, and these again have their side branches, on the ends of all which, as well as on the rest of the main stock, the young teasels are formed.

These commence blossoming about the middle of July, and usually by the 1st of August the earliest are sufficiently ripe for cutting. This should be done as soon as the blossom is entirely off the bur or ball, and before the seed is fully matured; otherwise, the teasel becomes discolored and brittle, and materially diminishes in its value. As the teasels are formed at different stages, and ripen successively, at different times, they are, consequently, not all fit for cutting at the same time. It therefore usually becomes necessary to go through the field two or three times, to collect them all at the proper age, to prevent any being injured by remaining on the stem while others are being matured.

The process of cutting may be performed most conveniently with a large knife, held by the workman in one hand, while he seizes the teasel with the other, and, by a slight, quick, downward stroke with the knife, separates the stalk from 3 to 6 inches below the teasel, which is thrown into a basket ready to receive it. After a little experience, the workman will cut and retain 3 or 4 teasels in the hand before emptying it in the basket. In the height of the season, an experienced workman will cut from 20,000 to 25,000 in a day, if the crop is a good one.

The gathering of the teasels will generally be completed in the month of August. While in the green state, as taken from the field, they should be carefully spread, about 6 inches in depth, in some open, airy place, under cover, on open floors, permitting a free circulation of air. Should the weather be very fair or dry, but little attention will be necessary; otherwise, they should be frequently turned, to prevent heating and mouldiness. When sufficiently dried, which may be known by the seed separating freely

in moving, they may be stored away, or packed in boxes for market. As to the yield that may be obtained per acre, it is so various in different localities, and so likely to be affected by a great variety of circumstances, that no certain average can be named, it varying from 50,000 to 200,000 per acre, when the plants all come to maturity, and, in some instances, exceeding the latter quantity.

The common white grub is a great enemy to the teasel, feeding on the root of the young plant to such an extent, in some instances, as to destroy a whole crop that promised fair when the plants first made their appearance, and even for some weeks after. The winter also makes great destruction in some years, the plants being partially or entirely killed by an open winter, accompanied by severe frost. This may also occur in consequence of a sudden change from moderate to severe weather in the spring, after the plants have commenced growing, which they will do as soon as the frost is entirely out of the ground. The young and tender leaves becoming then expanded and open in the centre or crown of the plant, are far less able to withstand a severe frost than in mid-winter. In exposed situations, the effects of frosts may be guarded against, in some measure, by the erection of temporary cross-fences of rails, boards, or other convenient materials, which will serve to keep a covering of snow on the plants, and protect them, in some degree, from the bleak winds and severe frosts of winter and early spring, and prevent, perhaps, the loss of a valuable crop. These cross-fences should be removed as soon as spring fairly opens. A failure of the crop sometimes occurs after the teasel are fully formed, if at that time there is a long continuance of warm wet weather, which may cause a rust to strike them, which is very likely to injure materially, if it does not wholly destroy the crop. This was peculiarly the case, in some sections, during the last season, many pieces having been entirely ruined by the rust. Other evils sometimes befall the crop, and blast the expectations of the cultivator, but it is not necessary, at this time, to specify them.

I have thus, in the scattering fragments of time hastily snatched between the performance of other and more pressing duties, endeavored to give a brief outline of the most prominent and essential features in the mode of cultivation of the teasel. Although much more might be written, still, in this, as in all other matters appertaining to agriculture, very much that is essential can only be learned by experience.

Hoping that what I have thus hastily written will be acceptable to you, and also prove the means of calling the attention of others to the subject, I remain,

Very respectfully yours,

LORENZO ROUSE.

Union, Franklin County, Missouri, December 17th, 1850.

Sir:—Your circular, dated August 26th, 1850, has just come under my observation, printed in the "Valley Farmer," at St. Louis, Missouri, a journal devoted to agriculture.

Desiring to furnish information on the important subject of agriculture, and the products of the soil, that may be useful to the country, I have taken the familiar branch of raising Irish potatoes. The little time left me for investigation and inquiry (before the 1st of January) will compel me to give

only my own experience, while I would have been pleased to add that of my neighbors also.

Irish Potatoes.—This is a good crop for the Western States, and, in first-rate ground, will yield 200 bushels per acre, and, in some instances, it has been known to exceed that amount. The best mode of raising them is to drill them in deep furrows, and cover them over first with rotten straw, and then throw on the dirt. The furrows should be 3 feet apart, so as to admit a plough, the use of which will be necessary once or twice to kill the weeds. In no case would I cut the potato before planting, and, instead of planting the small ones, (which are generally reserved for seed,) I would plant the largest size. Large potatoes yield large potatoes, while small potatoes, when planted, yield small potatoes. This is true, and let him who doubts it give a fair trial to the sizes, and the difference will be seen. The common white potato is the best for family use, but not so prolific as the large red-skin potato. This last quality is fine for fattening hogs and cattle, and, when boiled, will be eaten by them with an almost ravenous appetite. I consider potatoes the cheapest crop that can be raised, and, at the same time, one that repays the farmer better than almost any other.

Irish potatoes are now worth 75 cents a bushel in this county, and are never sold for less than 25 cents. So, you see that an acre, yielding 150 bushels of potatoes, brings the farmer $37.50, at 25 cents per bushel, the lowest price, and, at present rates, would bring $112.50—a nice little sum from one acre of ground, that did not require more than two days' tilling.

I will try and obtain statistics of different crops, the average yield, &c., for next Report, and also give such information on some of the various branches of agriculture as I may be able to collect.

Very respectfully, your ob't servant,

E. B. JEFFRESS.

Hickory Creek, Louisa County, Virginia.

Sir:—In reply to your circular addressed to me, I will state that it is not to be expected that one individual can profitably answer your numerous queries.

Passing by the previous questions, I will make some remarks on the tobacco crop. The average yield, in this part of the country, is, I think, about 1000 pounds per acre, on good land, though more can be made on very rich or highly manured lands. I have made on some land as much as 2000 pounds per acre. The cost of production varies according to circumstances: the cost does not exceed $30 per acre. It is highly important that the plants should be set out early, and, consequently, great care and attention should be paid in raising early plants. I am satisfied, from experiments made by myself and others, that the application of Peruvian guano will greatly facilitate the early and rapid growth of the young plants. I have applied it, both with and without burning the land, and its effects were very beneficial in both instances.

Being encouraged by its success in growing wheat and other crops, I applied it broadcast on tobacco land, not using over 200 pounds per acre, and, on a portion of the crop, not over 100 pounds per acre. The effect was decided and highly favorable. The tobacco grew faster, and ripened

earlier than it did on better land adjoining, to which no guano had been applied, and the amount of the crop was unquestionably greatly increased.

I have pursued a plan in regard to topping tobacco, which I believe few planters in Virginia follow. I do not take off any of the bottom or ground leaves. I direct that the plant shall not be topped until it runs up high, nearly ready to blossom, then leaving the leaves on at the bottom for about four or five inches, the ordinary height of priming, I leave about eight leaves above, more or less, according to the fertility of the soil, the season, time of year, &c. The advantages of this plan are, that the tobacco is made of finer texture, that there are very few *suckers*, and that, after four or five priming leaves are stripped off for lugs, and curing what I have left, there is enough to make two small bundles of tobacco, instead of one, and that, too, almost entirely free of sand or *dirt*. From experiments I have made in priming and not priming, I am fully satisfied that I make *more* tobacco from the same land, and get a better price for it. A few of my neighbors have been convinced of it, and are now adopting the same course of priming.

The best crops to grow in rotation, to maintain the fertility of tobacco land, are wheat and clover, tobacco one year, wheat one year, and clover two years, then tobacco again.

Fruit culture is receiving increased attention. Apples, the most certain and durable kind of fruit, can be and are now by some raised with profit. Good apples are decidedly better food than potatoes for hogs and cattle.

The best variety for winter use known in this part of the country is called Milam; its color is brownish red, mellows early in the fall, is of delicious flavor, and, with ordinary care, will keep until June.

The Catawba and other grapes are extensively cultivated for the table, and but little attention is paid to wine-making in these temperance days, when more money can be made by other pursuits.

Being pressed for time, I have hastily sketched off the above crude remarks, which are at your service.

I am, very respectfully, yours,

WILLIAM A. GILLESPIE.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Tishomingo County, Mississippi, December 21st, 1850.

Sir:—The Agricultural Circular of the 26th August was handed to me a few days since for perusal, and I have concluded to write a few lines in answer to some of the questions therein propounded—not that I expect to add any thing of particular interest to the common stock, but, by writing something, I may probably receive the Patent Office Report, which will enable me to profit by the experience of more skilful planters embodied therein.

Wheat.—Varieties in use here are generally Orleans and red spring; I prefer the former; it is usually sown on corn or cotton land, after the crop is gathered; three-quarters to one bushel of seed per acre, put in with small ploughs, running two or three inches deep, and seldom harrowed or brushed—consequently the ground is very uneven, and a small crop the result, say

from 5 to 7 bushels per acre. There is no preparation of seed, except being soaked in a strong solution of blue vitriol, for from 12 to 24 hours previous to sowing, to prevent smut, which is effectually done by this process. It is generally sown from the 20th October until the 15th November, and harvested between the 25th of May and 5th of June: it is sown thus late to prevent the ravages of the Hessian-fly; but I believe that wheat might be put in in August or September, and would furnish a good winter pasture for sheep or calves; by being grazed close in the winter, the fly is destroyed and the wheat not materially injured. I have tried this several times on a small scale, with very good success. For several years, I have sown wheat on oat-stubble, in the following manner:—Break the ground with a heavy, two-horse plough, running from 4 to 6 inches deep; (if this was followed by a sub-soil plough, the yield would be greatly increased;) I then run a heavy iron-toothed harrow lengthwise the furrow; I then put about one bushel of seed per acre, plough with a small plough the same way, and finish by harrowing or rolling; a light top-dressing of rotten straw long manure, or even leaves, will increase the yield considerably. Without this dressing I have usually made from 10 to 15 bushels per acre; the average price here per bushel the present year is $1. To prevent weevils, it is only necessary to get the wheat out as early as possible, have it well sun-dried and suffered to cool thoroughly, then put it in tight casks or boxes, in a cool place, (a good cellar is the best place,) and no weevil will be seen for 12 months.

After wheat, I plant corn, by first breaking and pulverizing the ground well; lay off rows 4½ feet apart, with a scooter or bull-tongue plough, throw two furrows to it with a turn plough, check off same distance, drop from 4 to 6 grains of large white corn to the hill, cover with a hoe, and then all the manure I can rake and scrape is put on the hill, at the rate of a shovel-full to each hill. The corn when half leg high is thinned to two stalks. I plough twice or three times, and finish the cultivation with a light harrow or cultivator. The second ploughing I plant the red-ripper or tory pea, in the step, from 10 to 20 in a place: they are a fine bearer, and a good renovator. I gather from 30 to 50 bushels of corn per acre, (but this is a poor common yield.) After the corn is gathered, I turn in my hogs, and very little corn will make them good pork. This crop is followed by oats, with a yield of from 15 to 25 bushels per acre, worth from 33 to 40 cents per bushel. I have followed this system of tillage for 10 years, and am confident my land has improved in fertility. One hundred pounds of corn, fed dry to hogs, will produce 20 to 25 pounds of pork; if boiled or soaked until soft, from 30 to 35 pounds; the manure from any given quantity of corn fed to hogs, if carefully saved, and skilfully applied to corn when planted, will increase the product from 30 to 40 per cent. of the amount thus fed away.

Sweet potatoes are a valuable crop for the table, for milch-cows, or hogs, fed either boiled or raw. The white or red yam are the kind generally cultivated here. These are generally bedded out, say from the 15th of March to the 1st of April, to secure a good and early crop of slips or plants Dig a ditch 3 feet wide, 18 inches deep, and, for every bushel of seed, 3 feet long; fill this ditch to within 4 or 5 inches of the top, with fresh stable manure; then throw on sufficient of earth to raise it a little above the level of the surrounding ground, so as to prevent excess of water standing on the bed; on this, lay the potatoes so as not to touch each other; then cover with earth to the depth of 2 or 3 inches, as weeds and grass will first make

their appearance, this depth will allow you to scrape off with a hoe or rake the first crop of weeds, leaving the covering 1½ to 2 inches thick; the ground intended to be planted should be well broken and pulverized; when the slips begin to come up, lay off rows 3 feet wide, and bed up with a good turn-plough, check the same distance the other way, and make hills, leaving the top flat, so as to catch the rain; when the slips are 3 or 4 inches high, they will do to plant. Should there not come a season to plant when the bed is well covered with plants, draw them in the evening, dip the roots in water, plant 1 in each hill, leaving 2 or 3 leaves above the ground, press the dirt close round them, pour on from ¼ to ½ pint of water to each plant, repeat next evening, and they will generally live. Four bushels of seed bedded out will be sufficient to plant one acre; in good time, after culture; as soon as the vines begin to run, scrape down with hoes; weed when they have reached 18 inches or 2 feet in length, (some will be longer, of course,) cut off the vines to within 6 or 8 inches of the root, plough both ways with a scooter-plough, running pretty deep into the hills, so as to loosen them up; hill up with a hoe, being careful to cover no part of the running vine. By cutting off the vines as above directed, new vines will start out and cover the ground much sooner than they would otherwise do; and should you be scarce of slips, the vines thus cut off answer every purpose planted in the same way; the yield is generally from 200 to 300 bushels per acre, and worth from 30 to 50 cents per bushel. On suitable fertile land, no manure is necessary: strong stable or barnyard manure injures both the flavour and smoothness of the potato: rotten straw, or leaves, are best applied broadcast. Those intended for table use may be kept in a cellar or house made for the purpose, or they may be kept in the following manner:—Raise a bank a little above the level of the surrounding ground, cover with dry straw, pile up the potatoes as high as you can lift dirt with a spade, cover with dry straw, then with earth to the depth of 10 or 12 inches, put a good coat of vines over this, and they are safe. I have not failed in upwards of 20 years to keep them through the winter in this way.

East Port, Miss.

I am, very respectfully,
Your most obedient servant,
JAMES WORD.

THOMAS EWBANK, Esq.,
Commissioner of Patents.

RICE CULTURE.

Matanza Plantation on Pee Dee, near Georgetown, S. C.
6th January, 1851.

Sir:—My time has been so much otherwise engrossed since the harvest, that it has not been in my power to communicate with you earlier, and now (if indeed it be not too late for your purpose) I must write briefly, and generally, in relation to the rice crop.

Our lands are improving under the grateful influence of the fallows and rotation practised by me, as that of a system, first in 1837–8, and they produce now rice of better quality than formerly. So much is this the fact, that there is a class of purchasers recognised in the Charleston market

who will be content with nothing but the choicest samples, and for these they are willing to pay an extra price.

This system, extended as it is, and greatly improved, in the hands of my observant, skilful, and judicious neighbors of Waccamaw and Sandy Island, by manuring with rice-straw, chaff, and even flour, has been one among the chief means of producing the beautiful "long-grain" rice (cultivated now by the two most successful and experienced planters in this district, and by not more than two others, as far as I know) in the highest state of maturity.

Rice straw has long been valued as an excellent manure, when listed in and rotted, for upland corn and potatoes. It has latterly been used in the same way as a dressing for rice in the fallow swamp-land, on Sandy Island, and with favorable results.

Rice chaff, too, which formerly was discharged from the mill into the "race-way," in order to get rid of it, since its analysis by Prof. Shepard, for our Agricultural Society, is now used to some extent in renovating old lands. It is distributed over the surface, some three inches deep, and ploughed in, stimulating the production of the soil, and improving the quality of the grain.

Rice flour, notoriously of value as food for hogs, cattle, and poultry, and selling readily, when corn is scarce, at from 12 to 20 cents per bushel, has, within a very few years past, contributed its share towards improving in both quality and quantity a particular crop in Waccamaw.

The crop of last year, (1850–1,) affording, as it does, a good portion of very prime rice, where the salt-water did not affect it, will prove to be some 10 per cent. short, as estimated by us. This diminution is believed to be owing, chiefly, to the high winds which passed over the tide-lands about the middle of August last, when the greater half of the growing rice-plants were still in bloom.

Rice is essentially a "swamp-seed" here.

We do not cultivate any on the upland.

Every year, however, it is grown in small patches in the interior, and tended mostly with the plough.

The best kind of rice for this purpose is, I believe, the old-fashioned "white-seed," which was the only variety cultivated in the State until late in the last century, when was introduced among tide-swamp planters the "gold-seed rice," which is now universally approved. The "bearded rice," a variety of white rice, with a very long awn, was imported some years ago for this very purpose, (upland planting :) but, I believe, it is now nowhere seen but to be eradicated.

The "long-grain" seed alluded to above, some account of which is given in the proceedings of the State Agricultural Society of South Carolina, is the choicest variety now cultivated in this region. Like the ordinary seed, it requires particular care and attention throughout the process of culture, to have it produced of the primest quality. But, when thus produced, if it be carefully milled and skilfully prepared, the long-grain rice will command in the winter market from 50 cents to $1 per 100 lbs. more than the very best qualities of the ordinary small grain.

For example, during the month of December just past, the market in Charleston for small grain has ranged from $3 and $3.25 for prime, to $3.37½ and $3.50 per 100 lbs. for choice. Whereas the market for long grain has been influenced by fancy. Prices have been obtained for this

kind of $4.25 per 100 lbs., $4.50 also, and even $5 for a small fancy lot.

These prices are never reported; but, having been informed that they were actually paid, I feel bound to mention the fact, when answering your inquiries as to improvements of the grain.

A specimen of this grain, with the entire plant, including the root, has been prepared, and will be sent to the Great Fair in London.

I have the honor to be, very respectfully,

R. F. W. ALLSTON.

Sir:—Your circular of August 26th, franked to me by the Hon. J. Smith, Senator from Connecticut, was received early in autumn, but got mislaid, and has just come to hand; and I would here remark, that I have turned my attention almost wholly to sheep and wool, but as yet I have not had experience enough to justify me in saying which is the most profitable branch of husbandry, stock or wool-growing. The prices I obtained for my wool, this year, I call remunerative—think it has paid me about 20 per cent. I have a flock of about 1000, mostly Saxons; I sheared from them, on an average, 2¾ pounds per head the last clip. I calculate to raise 80 lambs from 100 ewes; and I feed my sheep during the winter from 4 to 6 quarts of corn per day to 50 sheep, and what good hay they will eat; salt my hay when it is put up, 4 quarts to the ton. The sheep in this county are generally healthy, and there has been commendable zeal with the wool-growers in improving their flocks and wool for 2 or 3 years past.

Respectfully yours,

JULIUS S. PRICHARD.

Brunswick, Medina County, Ohio, Dec. 30th, 1850.

Cabarus County, N. C., December 31st, 1850.

Dear Sir:—I have been favored with a copy of your excellent Report for the year 1848. I have delayed my remarks to the latest hour of the present year. January, February, and March very cold and much rain, and even April very cold. The rains continued through the month of May, and up to the 3d of June. July very dry, and, up to the 24th of August, even as dry as the year 1845. Then great rain and wind from the north-west, that blew down the corn and overflowed the low grounds to a great extent. September showery; October favorable to cotton; November fine to the 17th, when there was a killing frost; and December fine for the gathering of crops till the 27th; but it went out pretty cold and wet.

Wheat not so good a crop as in 1849 by 20 per cent., although a greater quantity was sown than had been for many years. My residence, Cabarus county, Harrisburgh, School district No. 11, being 19 or 20 farmers in said district, but two besides myself raised over 100 bushels, it was so injured by the rust. Not a half crop was made. The time of sowing, from 25th of October to the 30th of November. The blue-stem white wheat much injured by the rust; the golden chaff also, with rust and big cheat, that infest

our fields. The May wheat was all that was a good crop: weight, 64 lbs. to the bushel. Mediterranean is pretty good in our soil. Average crop on good land, 10 and 12 bushels to the acre. Price, from $1 to $1.25 per bushel. Indian corn is cultivated with good success in our county. The average yield, on good land, is 40 bushels per acre, and the average price is 50 cents per bushel; but this corn sold from the heap, in a very green state, at 75 cents. The drought in the months of July and August was so severe that there has been a very short crop; but I hope, with the surplus of old corn that is yet on hand, there will be a plenty to keep the price from going above 75 cents.

Cotton.—The season for this crop was, in the beginning, cold and backward and very wet. Rains continued to the 3d of June, which gave the crop a bad start; but the latter part of the cotton season was favorable both for working and gathering. No killing frost to 17th November. The time of opening so favorable, that I think there is an average crop. It will be larger than 1849; but how much, I can make no calculation.

Cotton is the important staple of this section of North Carolina. By it thousands of dollars are made, although the seasons are short and the spring cold, that make it difficult getting a start; but there is nothing the farmer can make so much by as cotton, the price being good this season, viz. from $12 to $13 per hundred in our near markets. The time of planting the crop is from the 15th of April to the 5th of May. The present crop is all gathered and in market. Negroes hire, this year, at $90 and $100 by the year.

With respect, your humble servant,

JOSHUA HARRIS.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Sir:—In answer to your circular, I will suggest the following method of cultivation, without confining myself to any form of questions or answers. Grass or hay is our most essential as well as our most sure and profitable crop, being less liable to accidents and producing a greater profit upon the labour expended than any other, and forms the basis upon which we build our beef, mutton, wool, butter, cheese, horses, hides, tallow, &c.; therefore low, wet land, not suitable for the plough, and intended for mowing, should never be grazed. In this way a good crop of hay may be had for many years, without the application of manure, which, when applied, should be directly after the crop is taken off. The quantity of manure that may be profitably put upon an acre of tillage land in producing corn, wheat, &c., should conform to the wants of the soil, to enable it to bear grass. One acre of worn-out mowing land ploughed in the fall, and put to oats in the spring, will usually produce 30 bushels without manure, and yield a small profit, as also will beans, peas, or potatoes; the latter doing better without manure, in consequence of the rot; either crop leaving the ground suitable for the cultivation of corn the succeeding year. Then, by spreading and immediately ploughing in 40 loads or 20 cords of manure in the fall, and applying 10 or 12 loads in the hill in the spring, and planting before the 1st of June, 3½ feet asunder each way, hoeing twice with the use of the horse and cultivator, and weeding the third time without it, we usually get from 50

to 65 bushels per acre, according to the value of the manure; that from the back-house and hog-yard being best, and that from barns, which has been sheltered from the rain and sunshine, being worth at least one-third more than such as has been exposed. This can be accomplished as easily and as cheap as the raising of but 30 bushels per acre, (which is about an average crop for Somerset county, Maine,) except the application of the extra manure, the cost of which should not be taken into the account, as it will produce 16 or more bushels of wheat the succeeding year, and fit the ground for grass. The third hoeing, besides forwarding the corn, will be more than balanced in the increase of bushels, and still more in the succeeding crops of wheat and grass. A greater crop of corn is often obtained, sometimes 100 bushels or more, but usually at the expense of many other acres. I never of late have applied green, long, or unfermented manures to the soil, being convinced by actual experiment that it is of less value to the present and succeeding crops; but invariably heap up all that lies flat upon the yard, and composed partly of straw, that it may undergo a process of fermentation, so that, when applied, it will easily incorporate with the soil; but if it is hauled to the field and left in long rows in the fall, as is practised by many, to be used in the spring, the wind and rain will destroy all its valuable properties, and, if it be put in the hill, will be worse than nothing. For manuring in the hill, I prefer a compost consisting of muck, lime, and ashes. The varieties of corn preferred are the 8-rowed orange-colored, producing more corn from a bushel of ears than the large kinds, and ripening earlier. Usually plant as early as the ground will admit, say the 15th of May, and often as late as the 10th of June. Average price, from 75 cents to $1 per bushel. Wheat, (spring,) red bearded or Georgia, stands the attacks of the rust and weevil better than other varieties; otherwise the bald would be rather preferable. Average per acre, about 16 bushels, succeeding a corn crop, which was well manured and kept free from weeds. Time of seeding, from the 18th to the 25th of May. Quantity of seed, from 1½ to 2 bushels per acre, according to the state of the land.

Ploughing.—In ploughing in manure for corn, usually go from 8 to 12 inches in depth, according to the quantity of manure, following, at the same depth, the succeeding year for wheat. Lands not exposed to the wash of uplands, and intended for wheat, should be ploughed in the fall and spring. The wheat crop had been increasing for several years prior to 1839, averaging in 1838 something over 20 bushels per acre, and in 1839 falling below 10, and continuing to decrease to 5; showing that it was not caused by a gradual draught upon the soil, but mainly attributable to the rust and weevil. But it has been increasing for the last three years. I have tried several preparations for seed-wheat, but consider them worthless. Average price, $1.33 per bushel. Winter wheat has been lately introduced into Maine, and so far has done well; and the quantity sowed this year is sufficient to test our ability to raise it.

Pork, if made wholly on corn, will cost 8 cents per pound; but, a part corn boiled, and mixed with other and cheaper feed, may be profitable. Milk is cheaper, and will make pork fatter. Maine can, and ought to make her own pork, and a superior article to Southern or Western, but it can never be done as cheap.

The best varieties of apples for barrelling are, Roxbury Russets and Baldwins, the cultivation of which promises a fair profit, as those raised in our latitude are hard and suitable for transportation. I have a number

of trees that were grafted 35 years ago, and find that those that were grafted in the stump, near the ground, when not more than 1½ inch in diameter, are much shorter-lived than those grafted near the top and in the limbs. It is a ruinous practice to cut off the top of young apple-trees, as is often done, about 5 feet from the ground, in order to give them a wide-spreading top, thereby causing them to send out a number of sprouts near the wound, which, as they grow to form a top, crowd each other at the main stock, till the sap ceases to flow, and destroys the tree. The main trunk should not be touched, but serve as a conductor for the sap, and throw off limbs at a proper distance from each other. Many valuable hints may be gained by attentively viewing the trees of the forest, where the limbs of a tree rarely war against each other, from the fact that it is natural for them to grow right, without the dissecting knife to give them an artificial appearance.

Very respectfully yours,

WILLIAM D. HAYDEN.

Madison County, State of Maine, Dec. 23d, 1850.

THOMAS EWBANK, Esq.,
Commissioner of Patents.

North Kingstown, January 20th, 1851,
Western Congressional District, R. I.

Sir:—From my own observation, and the best information that could be obtained, I will endeavor to comply with the request contained in your circular, which required a statement of the agricultural products of this district, as compared with the preceding year.

The improved system of agriculture, noticed in my last, is annually progressing—the persevering industry and judicious management pursued by many of our farmers bids fair to restore to the soil that original fertility of which it has been deprived by a long course of cropping without manuring. Yet, we have some among us who are still wedded to their traditional custom of making no return to the land for its increase of products; but that class is diminishing, and their places being filled by their descendants, who are more susceptible of improvement.

The past season has been very favorable for most agricultural crops; the spring, however, was cold and backward, which retarded planting and sowing 8 or 10 days beyond the usual time. Twice the quantity of snow fell in March and April that we had in all winter. May was wet and cloudy, and not more than one week's sunshine during the month, but no frost. The summer was remarkable for its temperature; no extremes of heat and cold, and no lack of rain. The rains were frequent, and of short duration, and for the most part cleared off warm and pleasant. Notwithstanding an unusual quantity of rain fell during the summer, yet we had no destructive freshets, that visited some sections of our country, causing much damage to the crops. Autumn was very serene and pleasant, with much less rain than during summer, which gave a good season for ripening and securing crops. No killing frost till the last of October, and none to obstruct the plough before December. The crops the past season were more than an average for the last 10 years, and at least 25 per cent. better than the preceding year. On the last of May, vegetation was 10 days

later than in ordinary seasons; but so rapid was its growth in June that, at the end of the month, it had received all that was lost by the backwardness of the spring.

Indian Corn was 30 per cent. better than last year, and of a superior quality. It ripened earlier, and there was much less of the soft, blighty kind. Rye gave about the same yield, but, more being sown, it is estimated that 10 per cent. more was raised. The price of corn and rye, the same, 80 cents per bushel. Other grain crops, such as wheat, barley, oats, and buckwheat, are not raised in sufficient quantities to require special notice.

Potatoes have suffered more by the disease, in this district, than in any one season since it made its appearance. An unusual quantity was planted last spring, and the prospect of a good harvest was held out till the first of September, when the blight struck them. At first it was not considered very alarming, as we had had a touch of it, in some particular localities, every year since its commencement, and it was thought that the failure would be greater than in former years. A considerable part of the early planting has succeeded in a sound state before the rot commenced; and the price opened lower than for several years preceding. Farmers offered their entire crops for 30 cents a bushel, but could find no buyers at that price. On digging the late kind, it was found that but very few yields had escaped the disease; and that the entire crop would be short full one third when the extent of the rot was known; and that it was more fatal in the neighboring States than in this. The price advanced to 50, and from that gradually to 80 cents a bushel. The crop is estimated 20 per cent. short of last year, and the price full 50 per cent. higher. The advance in the price being greater than the deficiency in the crop, the consumer has had to bear more than the whole loss, which has been the case in this district ever since the rot made its appearance. This may be accounted for by the disease being less fatal here than in the adjoining States. The producer, instead of being the sufferer by the malady, has actually been the gainer, as his product has sold for more than if there had been no failure in the crop.

Onions were 30 per cent. better, and more planted, which made the crop 40 per cent. above last year. Carrots and other roots, about the same as last year. One man in this town raised 1117 bushels of onions, and 1288 of carrots, aggregate 2405 bushels, on less than 3 acres.

Hay was above an average of the last 10 years, and 33 per cent. better than the preceding year. The weather was rather unfavorable for securing the crop. Rains were frequent during the season of haying; but of short duration, and generally succeeded by a clear sun. Hay that got wet one day, was, for the most part, dried the next, so that but a small part was put up in a damaged state; price, from $12 to $15 per ton.

Dairy—Owing to an excellent season for pasturage, was 25 or 30 per cent. better than last year.

Fruit.—Apples are the principal kind cultivated. This being the bearing year for orchards, the yield was 100 per cent. more than last year; the price at harvest was 25 cents per bushel, but at present they are worth 75. Peas, peaches, plums, grapes, &c. are not extensively cultivated—mostly for domestic use. Garden vegetables now very good—30 per cent. better than last year.

Yours respectfully,

J. G. CHADSEY.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Ann Arbor, Washtenaw County, Michigan, Nov. 25th, 1850.

Sir:—I give you below such facts as have come to my knowledge on the subject of agriculture in our region.

Wheat.—We use the white flint, Soules, the red-chaff, bald, and bearded, the Mediterranean, and blue-straw. The flint, Soules, and the red-chaff are the most approved, the Mediterranean yields well, and thus far is free from rust and insects—but the flour is dark, and consequently going out of use; the average product the past season is 20 bushels an acre; time of seeding, from the 1st of September to the 1st of October; the early sown is generally the best; usually sow 5 pecks per acre; plough always twice on fallow—better to be 3 times, and plough 6 to 8 inches deep; the yield per acre is rather increasing, owing to better tillage, and keeping sheep, &c. We have not been troubled with the Hessian-fly for 2 years past, and the weevil has not crossed the lake yet, that I am aware of, except in a bushel of wheat I received from an unknown friend from the East, and I gave them so good a portion of slacked lime and strong brine, that I have no fears of an increase from that source. The price at this place has averaged 70 cents per bushel this fall.

As regards *corn*, the eight-rowed yellow is rather the best with us; the average product being 50 bushels per acre, and cost about 20 cents to produce it, exclusive of use of land. The best method of raising is to plough in the fall, and again in the spring; plant about the 5th of May, in rows, 3 feet apart each way, 4 grains in a hill; cultivate or plough twice, and hoe twice. Best method of feeding is to grind and cook; but the most practised method is to feed raw in the ear. Most of our land is improved for corn by the application of plaster, and seeding to clover.

The average of oats and barley is 40 bushels, rye 30 bushels, beans 15: peas do not do well, being invariably buggy, and frequently an entire failure. The hay cut is 1½ ton to the acre on the average; we sow 8 to 12 lbs. clover-seed to the acre, and, when mixed with herds-grass, 6 to 8 lbs. of each; on wet sods red-top is used, and is very good for hay or feeding; it grows well on our natural meadows and marshes, of which we have a great many, where the grass is good for feeding and hay, some of blue-joint, wild oats, and a great many varieties which neat cattle are very fond of, and fat on remarkably well: such land, by ditching and then sowing with timothy and red-top, makes most excellent for mowing or pasture; but seldom makes good plough-land. There has been but little attention to dairies until the last 4 or 5 years, which has increased, and we have begun to ship to New York; but consume all our cheese. Butter is worth 12½ cents, and cheese 6 cents a pound.

The average cost of raising neat cattle to 3 years old is $12, which is about the usual price of heifers; and steers are worth about $35 the pair; good dairy-cows, new milch, worth about $16; the Durham are the easiest to fatten.

Wool-growing is very profitable this year, and, next to wheat-raising, is the chief business of our farmers. Coarse wool, common native, costs about 15 cents to grow it; finer, say Paulo Merino, about the same; Spanish Merino, 20 cents; Saxony, 33 cents; large sheep, Bakewell or Southdown, the best and most profitable for mutton; about middling kind, heavy-fleeced

Merino most profitable for wool; about two-thirds as many lambs as ewes are raised annually.

Our hogs have rather degenerated in this county, within 5 years, owing to the fact that Berkshires were introduced, which have not proved to be an improvement. Leicestershire, Byfield, and grass-breed are the best, the first of which, with a cross of the second, is now being introduced.

Cotton, sugar-cane, rice, tobacco, hemp, and darkies do not thrive well in this climate.

Root crops are on the increase, such as turnips and ruta baga, carrots, and beets, and mangel wurzel being only experimented upon. Turnips do very well on new land, and all will flourish on a rich, sandy loam, with good hoeing, to keep clear of weeds.

Potatoes have done badly for the past four years, on account of the rot, but seem to be getting over it; the average yield is 200 bushels per acre. The Carolina sweet potato is beginning to be successfully cultivated by a few individuals, who have the right kind of warm, sandy soil.

A great deal of attention is being paid to raising and improving fruit, particularly apples, which are usually profitable; sweet apples, with pumpkins and meal, are better and cheaper than potatoes for fattening hogs and cattle; the best apples for winter keeping are the Russet, the Spitzenburg, and the Winter Greening. We have not been troubled with the blight as yet. Grapes will not be a profitable fruit on account of frosts in the spring.

Pears, *apples*, *quinces*, and *peaches* do well, and are as fine as in any country; plums do well in new gardens, but are destroyed by the curculio in a few years; we cannot yet discover any certain remedy, unless it be a daily and almost hourly shaking the tree in the spring, and pinching the rascals' heads. Our lands being new, do not need manure; so that but little attention has been paid to the subject, except to clear the barn-yards. You will have a report from one of the professors of our University on the subject of meteorology. And now, my dear sir, to sum it all up, I think there is no better country in the world, all things considered, for the farmer, than Washtenaw county, Michigan; our soil is good, land as easily tilled as it ought to be to prevent idleness; climate mild and healthy; sufficient quantity of wood, and good water; land rolling, but not hilly or mountainous; good mill-streams; plenty of small and beautiful lakes of pure water, abounding with fish; intelligent, industrious, well-educated inhabitants; good schools, and churches of all denominations. The rapidly increasing facilities for transportation giving us a market almost equal to a day's ride of Eastern cities.

Very respectfully, yours, &c.

WILLIAM S. MAYNARD.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Harwich, (Cape Cod,) Barnstable County, Massachusetts.
December 20th, 1850.

Sir:—In reply to your circular of August 26th, I would state, that this town was originally covered with a growth of oak and pine wood, a large portion of which has been cut off, and the land cleared. The soil, which is

naturally light and sandy, by the process of continual cropping, without restoring an equivalent, which has been carried on for generations, has become, to a great extent, exhausted. The average crop of corn or maize, which is the principal article produced, is not over 15 bushels to the acre; but it is found that these worn-out lands are very easily reclaimed. By applying pond-mud and muck, which are very abundant in this region, at the rate of 100 or 200 horse-loads to the acre, and sowing buckwheat, and turning it under, twice a year, when in blossom, or clover once a year, it has been well ascertained that, in one or two years, fields which were considered almost worthless are made to produce 40 to 50 bushels of corn to the acre. Sea-weed, which abounds on our coast, makes a valuable manure when turned under, as taken from the shore; but its value is very much increased when carted into the barn-yard or hog-pen, with mud or muck in equal parts, and left to remain a few months. The most esteemed varieties of corn are the yellow Canada, and round, smutty white. The best system of culture we think, is to plough in the spring, plant the corn about the 10th of May, in hills 3½ to 4 feet apart, each way; thin out to 3 plants in a hill, hoeing four times during the season, each time running the plough or cultivator twice in a row one way, or, what is better, both ways. The harrow, which has been used from time immemorial, has been almost superseded by the plough and cultivator, which leave the ground in a better situation. No hilling is allowed around the corn, but the ground kept as level as possible. The corn is harvested by cutting near the ground, and is carted from the field in the husks, piled up in ridges, and then, during the pleasant evenings of *harvest-moon*, *husked out*, after the old New-England fashion, which is, by inviting one's neighbors and friends to *lend him a hand*. They sometimes assemble to the number of fifty or more, and in one evening husk a farmer's whole crop, which would have taken him, with his ordinary help, several weeks.

Rye has always been raised here in considerable quantities. It has been the practice to sow rye, (16 quarts per acre,) on the corn-field, at the last hoeing, about the middle of August, and an average crop has been 10 bushels per acre. But for the few last years, the crop has been very much less, and consequently less attention is paid to it. Its failure is owing, partly, to the exhausted state of the soil, and partly to the increased bleakness of the fields, in consequence of the ruthless inroads made upon the surrounding forests.

Potatoes are a valuable crop, especially since the rot has become so general, as those raised on the most sandy soil are less affected by that disease. It is also ascertained that potatoes raised on *new ground*, or land lately cleared, are less subject to disease, than on land under longer cultivation.

The *cranberry*, which is the spontaneous production of nearly all our peat-bogs, is improved remarkably by cultivation; and beach sand, or that which is most free from vegetable matter, is found to be the very best article for spreading upon the mud in which to set the vines. Considerable attention is being paid to their cultivation, and it promises to be a profitable business.

Fruit Trees thrive well in this soil with proper care and cultivation. There is much encouragement for the rearing of the apple-tree, from the absence of the canker-worm, which, although it nearly destroys orchards in the neighboring towns, has never appeared in Harwich. This is thought to be owing to the surrounding pine forests, which, in some way, prevent the migration of that insect.

Among the ornamental trees imported in considerable quantities, the silver abele flourishes remarkably in our soil.

The facility with which a growth of wood can be raised upon our worn-out lands is worthy of notice. Every neglected field, in a very few years, is covered by young pines, which spring up from the seed scattered by the winds, and grow rapidly; sometimes, also, a beautiful growth of pines is produced by sowing.

The *meteorology* of the cape is rather peculiar.

The weather is subject to very sudden changes, and is much cooler in summer and warmer in winter than in other parts of New England; the ocean, which nearly surrounds the cape, acting as a regulator of the temperature.

The subjoined tables will show the mean average temperature, as noted from the thermometer, morning, noon, and night, during the months of June, July, August, and September, for the years 1847 and 1848, and also the warmest and coldest days in those months.

	1847.				1848.		
Mean Temperature.	Sunrise.	Noon.	Sunset.	*Mean Temperature.*	Sunrise.	Noon.	Sunset.
June	57	76	64	June	50	73	63
July	64	81	69	July	64	78	67
August	63	79	68	August	63	82	68
September	59	71	63	September	57	71	61
Warmest Days.				*Warmest Days.*			
June 27	65	96	72	June 16	60	90	79
July 5	64	100	74	July 15	64	89	70
August 4	60	95	74	August 7	64	96	76
September 5	74	84	72	September 6	63	83	70
Coldest Days.				*Coldest Days.*			
June 1	50	58	56	June 8	50	56	50
July 1	60	72	68	July 8	49	72	56
August 6	58	67	60	August 20	59	64	60
September 29	58	66	55	September 23	41	56	53

Very respectfully, your ob't serv't,

OBED BROOKS, JR.

Harwich, Barnstable County, Mass.

Protumna, near Martinsburg, Berkely County, Virginia,
January 15th, 1851.

Sir:—In reply to your circular, I beg to present to you answers to some of the interrogatories.

Wheat.—In use, Zimmerman's, blue-stem, white, and Mediterranean; the latter is most in favor just now. We have two kinds of land in our county—limestone and slate. The average crop of the county in the finer land, for, say 10 consecutive years, is not over 11 bushels; on the latter, not over 8 bushels. One ploughing before harvest, except on very stiff clay land, is now the ordinary practice. We harrow well, sow Mediterranean wheat on stubble and corn ground, and other wheats on fallow—2 bushels of the former, and 1 and 3 pecks of the latter. The drill is getting into use, and is much approved of. Pennock's Pennsylvania drill is highly esteemed, and the wheat put in with this drill looks, generally, very well. I think the yield per acre is increasing, owing to more careful farming.

A neighbor of mine, the past year, raised, on 18 surveyed acres, 37 bushels and 1 peck of Mediterranean, on stubble ground; and 280 bushels were produced on 7 acres, within a few miles of me; and a miller, near Mill Creek, cut 104 bushels from 2 measured acres. I have raised 27½ bushels per acre on a small field. These are rare instances, but exhibit clearly the great yield land may be forced to by care. On strong land, some cultivate the half of the cleared land annually in corn and wheat—about one-fifth in corn annually. We sow clover, let it stand two years, pasture it, put it in wheat, stubble it; then corn it; and sow the corn ground down in the fall with wheat, and in the spring sow clover, a bushel to 8 acres: we thus get 3 crops of wheat, and 1 of corn. This is the general practice, though some let the corn ground lay till the following year, before sowing it down. We are not troubled with weevils; and Mediterranean is the only refuge we have from the Hessian-fly. Average price, 1850, $1.

Corn.—The dark yellow, between flint and gourd-seed, is the most approved seed; white gourd-seed is cultivated. The average product for 10 years, on limestone land, is not over 25 bushels; on slate, not over 12 bushels. I have raised 65 bushels per acre of measured shelled corn from one field, but it rarely happens; it was in a spirit of rivalry against some five or six neighbors, who cultivated 10 acres against mine.

Corn-and-cob meal is much approved of, and is getting into more general use. I, however, dislike giving 10 bushels of grain in one to have it ground, believing that the hogs get all that is not digested by the cattle.

Oats are cultivated without much success. I have raised 40 bushels to an acre, but it is usually a poor crop, yielding, on an average, not over 20 bushels. The cultivation of rye is almost abandoned; it rarely fills.

Clover and Grasses.—Quantity cut, from 1 to 4 tons per acre; generally about a ton; seeds preferred are timothy and red-top herdsgrass for low lands. I sow a bushel of timothy to 5 acres. Hay costs nothing to grow it but the land and cutting; we get it cut for about $1 per acre. Hay generally is worth, within 5 miles, $10 per ton.

Sheep.—This is a great market for sheep, for mutton. About 6000 are annually sent to Baltimore from this county, and they have a high reputation for flavor, but not for size; we think 70 pounds a large sheep. They are considered the most profitable animal we can pasture. We make but little on cattle.

Hogs.—The Chester and Berkshire cross are the best hogs we have. With the assistance of our stubbles and grass, 100 pounds of corn will produce 33 pounds of very fine pork. The best method of curing hams is, ¾ of a bushel of fine salt, mixed with 4 pounds of brown sugar and 4 pounds of saltpetre, to 1000 pounds of hams; changing the position of the hams once or twice in six weeks; smoke them incessantly with hickory till late in the spring, and soak them before you boil them.

Your ob't serv't,

FRANCIS PETERS.

Hon. THOMAS EWBANK,
Commissioner of Patents.

East Montpelier, Washington County, Vt., January 10, 1851.

Sir:—Your circular of inquiries relating to the productions and other matters connected with the agricultural operations of this part of the country, I have received, and now proceed to answer some of the questions it contained.

Your first inquiry relates to the production of wheat. This was formerly one of the best countries in the world for the production of that most valuable kind of grain, but since the weevil appeared, their ravages have been such that many of us do not attempt its cultivation. It is those only whose farms are favorably situated that can make it a successful business: on elevated situations, with a fair western exposure, they seldom fail of a good crop. Sixteen bushels per acre is about an average yield. Land that was cultivated with corn the year previous is preferred. Plough once, in the spring, 6 inches deep. 1½ bushels of seed, well washed, is used per acre. If the seed is thoroughly mixed with lime or ashes 12 hours previous to sowing the crop, it is seldom, if ever, affected with smut. The varieties most esteemed here are Lea, Black Sea, and red bald. The hedge-row has been tried, and proved a failure.

I cannot say that we have any system of rotation in crops; the most common practice is, oats the first year, corn the next; then follow with oats or wheat, and stock down with grass-seed. The price of flour governs the price of wheat: $1 per bushel is the price of good wheat at the present time.

Corn is our most important crop of grain. The variety raised is the eight rowed yellow, common to New England. There are other varieties cultivated, but not to any considerable extent. Average product per acre in this county, I think, does not exceed 35 bushels, while many of our best cultivators do not fall below 60 bushels. I was conversing, a few days since, with one of the best farmers of Orange county, who informed me that he planted, two years since, 4½ acres with corn, and the yield was 300 bushels, which he did not consider an uncommon crop. The cost of producing a bushel of corn varies but little from 50 cents. The most approved method of culture is to spread and plough in manure, and manure well in the hill; cover with the hoe; plant from the 10th to the 25th of May; use the cultivator and keep all weeds down, and there will be no failure of a crop in a common season. The most of the corn raised here is ground with the cob, and fed to cattle and horses without cooking: for hogs, I think the cob had better be dispensed with.

Oats are cultivated extensively: average yield, 45 bushels per acre. The quantity of seed used per acre is generally 4 bushels—some sow more and some sow less.

Barley is cultivated by very few. I think it an excellent kind of grain to mix with corn to feed to any animal. Land that will produce a good crop of oats will yield a good crop of barley.

Rye.—The cultivation of this grain is very limited. Brown bread cannot be made good without it.

Peas are raised to some extent, by mixing with oats, and sowed in that manner, for the purpose of raising provender to feed to hogs. Almost every man has his garden peas, and a little patch in the field for family use. There should be 4 bushels sowed to the acre, if not mixed. Peas are the least exhausting crop the farmer raises. Beans are cultivated but little, except for family use.

Hay is altogether the most important crop in this section: a failure in that is more sensibly felt than that of any other crop. The quantity cut per acre is about 1¼ tons; good, well-cultivated meadows, 2 tons. The best fertilizer for meadows is manure, which should be laid on unsparingly to every acre the farmer cultivates. I do not suppose this can be done every year, but as often as one ploughs a piece of meadow, it should be thoroughly manured before it is laid down. The effects of plaster are admirable on clay soil. I think, when applied to greensward oats, it will increase the crops four times its weight. Time of sowing is, when the oats are fairly out of the ground. The grass-seeds preferred are clover and timothy: 4 lbs. of clover and 8 qts. of timothy per acre are used. If the land is highly manured, the clover may be dispensed with. The growing of a ton of hay costs $5.

Dairy husbandry is a profitable branch of business: no man fails of success if he pursues it steadily, and is economical and industrious. Some three or four of my neighbors have given me the result of their past year's operations. One milked 24 cows; made butter only, average per cow, 181 lbs.; price obtained, 18 cts. per lb. Another milked 24 cows and heifers, and made cheese, average amount per cow, 408 lbs.; price in the city of Lowell, 7½ cts. Another milked 18 cows, made cheese a part of the time, and butter the remainder; average amount of cheese = cow, 416 lbs.; average amount of butter per cow, 38 lbs.; net proceeds of butter and cheese, $650.73. I keep but 5 cows; the average of butter made from them the past year is a trifle over 200 lbs. Three calves had all the milk they would take, until six weeks old, and raised two; sold the butter we had to spare to people near us, for 16 cts. per lb. It is the invariable practice, as far as my knowledge extends, with those that make butter, to set the milk about 36 hours, which is long enough for the cream to rise, which is then taken off and churned. None, in this vicinity, churn the milk. Our practice is to churn in the morning. When the weather is warm, and the butter comes soft, we wash it in cold water till the buttermilk will not color the water; salt the butter, set in a cool place till the next morning, then work it over with the hand. Some make use of the butter-worker, but I think a woman's hand, if it is clean and expeditiously used, is the best butter-worker I have ever seen. The butter is then put in tubs, usually made of spruce or fir, holding from 30 to 60 lbs.; fill to within two inches of the top; fit a cotton or linen cloth, the size of the tub-cover, with good, strong brine; let the cover fit tight, so as to exclude all the air, if possible. The mode of churn-

ing is very uniform; the churn used is the float, or sometimes the barrel-churn, made by Ruggles, Nourse & Co., of Boston; but, where the business is small, the old dash is preferable. I use one of Stone's, (I do not mean that the dash is of stone;) they are very easy to keep clean and sweet, and much better in warm weather. Fifteen pounds is enough to churn at once. The best butter and cheese commands the prices before stated, and there are none in this vicinity that are willing to be beat by another in producing a good article.

Neat cattle are reared extensively, and, in addition to the beef that is made, large numbers of young cattle are driven to Connecticut, Massachusetts, and Rhode Island. The cost of rearing, in the ordinary way, until 3 years old, is not far from $25. The price is so fluctuating for store cattle, that it is difficult to determine their average value. The price of good dairy-cows in the spring is $30, in the fall, $18 to $20. There has been little done here in foreign stock. Vermont has long been celebrated for raising good cattle, and we cannot see much improvement in the foreign breeds. I have seen beautiful animals produced by crossing with the important breeds, and if it were my object to make a large animal, I would select a Durham; if to make a given amount of money, the native breed would be preferred.

Sheep and *wool-growing* are profitable. Our flocks are very much reduced at the present time, owing to the failure of the hay crop of 1849, which was occasioned by the extreme drought of that season. There is but little comparative difference in growing a pound of coarse or fine wool; either will cost at least 34 cents. There is a very great difference in the amount produced from different flocks; it ranges from 4 to 5 lbs. per sheep. One flock in this vicinity, numbering 300, averaged 5 lbs. each, and was sold for 39 cents per lb. 100 sheep will consume 15 tons of hay during the winter. The pasturing will cost from $25 to $34. The large coarse-wooled breeds are much the most profitable for mutton, and less so for their fleeces: 2 lambs to 3 ewes are generally reared.

Hogs.—We used to make a large amount of pork for market, and it was a profitable business; but it has dwindled down to little more than enough for domestic purposes. The native breeds are the most esteemed. The Berkshires had a pretty extensive run here, but they proved to be of but little value, except for their foreign origin. There are some few of the Suffolk breed brought here from Massachusetts; their meat is said to possess a peculiarly excellent flavor. If it does not, I see no reason why they should be an improvement upon the native breed; they are quite small, but very handsome animals. The price of pork flesh is 5 cents per lb.

Root crops are but little attended to, except for family use; they are not cultivated as a field crop; but when their value is better understood, I think they will be extensively cultivated, especially if the *potato* malady continues. The potato crop is still an important one, notwithstanding the ill success we meet with. Before the appearance of the rot, the yield was from 200 to 400 bushels per acre; it is now uncertain: light, open soils are best to raise potatoes upon; manure light, plant deep, and the crop will be light, but generally sound. Land that has been least cultivated has proved to be the best. The most prolific and profitable varieties are the English white, and Long John, known in New York as the Mercer, I believe.

Fruit culture has been sadly neglected in this region; the old orchards have disappeared, and little or no pains is taken to supply their place with young trees. The effect is beginning to be *sensibly* felt upon the *purse*, and

that always awakens the energies of a New Englander. One man told me that he set over 6000 scions last spring; the method of engrafting most common, is to split the stock, the scion is made in form of a wedge, and inserted in the split, and the wounded parts covered with wax: but few die set in this manner. Sweet apples are of nearly as much value for the purpose of feeding to cattle and hogs as potatoes; whether they could be profitably cultivated in this climate for that purpose is problematical; I think they could not. We have few varieties here; some Baldwins, Greenings, Pumpkin, Sweet Pearmain, Spitzenberg, Pippin, Russet, Seeknofurther, and perhaps some few others are the varieties most cultivated. Our latitude is too high for the general cultivation of most kinds of stone-fruit.

Manures are not attended to as their value and importance demand; much has been said and written about the manner of applying it to land, while the great question in relation to increasing the *size of the heap* has been neglected; in that lies nearly all the sweet of good husbandry. There was a young man passing this way, some three or four years since, selling Bommer's patent for making manure, and several of our farmers purchased the right at $4 for a single farm, if I am not mistaken; but they do not think much of the speculation, I presume, for I am not aware of their practising upon the principle they purchased, in a single instance. The barn and hog yards are the principal sources to look for manure. There are various ways to increase the quantity and quality. The hog is a working animal, if not too highly fed; keep his yard well supplied with muck, straw, leaves from the forest, and, by all means, the weeds that grow in such profusion about our barns and dwellings, and he will convert the whole into good rich manure, and grow fat in the mean time; besides, the only effectual method of preserving it from waste, is to keep it under cover: permanent sheds for that purpose may be maintained with economy: rain and sunshine are admirably calculated to extract the fertilizing qualities of manure.

I have thus endeavored, in my own homely way, and in as brief a manner as I could, to answer some of the interrogations contained in your circular. I hope the time is not distant, when we shall be able to give a better account of our agricultural pursuits; there seems to be a spirit of emulation among the producing classes, that must lead to good results; and nothing, in my opinion, has done more to produce this feeling and action than the interesting and valuable Reports sent out from the Patent Office.

I am, sir, very respectfully, yours,

ISRAEL GOODWIN.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Farmington, Connecticut, January 16th, 1851.

Sir:—Yours is received, requesting information on the various branches of agriculture, to some of which I will reply, according to the best of my ability. The section of country in which I reside, in the valley of the Farmington river, is admirably adapted to produce grass and corn, which are our staple productions. Our meadows are annually overflowed, whereby we are enabled to obtain large crops of grass without the aid of stable or foreign manures.

In regard to your first inquiry, the raising of wheat, I would say that but very little has been raised in this neighborhood, until, within a few years past, some attempts have been made, and very successfully, by the aid of lime, by which we are enabled to raise very fair crops—in one instance, upwards of 40 bushels to the acre. My first attempts at raising wheat on a small scale was made last year, on 3 acres of potato ground. The land was alluvial, a sandy loam, and good soil, on which I raised by measure upwards of 75 bushels. Planted potatoes in 1849; after digging the potatoes, I ploughed the land 7 inches deep with one of Ruggles's ploughs, which is the only kind I use upon my farm, and sowed it at the rate of two bushels to the acre of the yellow bearded variety, and at the time of sowing I also spread and harrowed in with the wheat about 6 bushels of air-slaked Thomaston lime to the acre; and on the 3 acres I obtained upwards of 75 bushels of excellent wheat, most of which I sold for $1.50, for seed, to the neighboring farmers. The land on which this crop was raised had lain in grass for several years, and was manured with unfermented manure spread upon the land previous to ploughing for the potato crop, at the rate of about 20 cartloads (30 bushels) to the acre, and a mixture of lime, ashes, and plaster put in the hills—to the application of which I attribute the soundness and large yield of the crop.

My wheat was sowed about the 20th September, after soaking in a strong brine 12 hours, and then applying lime; at the time of harvesting, the straw was slightly rusted, but the berry was plump and sound. I have now 10 acres in wheat, which promises well; and I trust that the time may come when our farmers may, by the aid of lime and other manures, be enabled to raise wheat, at least for their own consumption.

The corn crop being our principal grain crop, and a most important one, and there being such a diversity of opinion in regard to the different varieties, the method of preparing the ground, manures, and whether most benefit will be derived by applying it in a fermented or unfermented state, I will only state my own experience in the matter; and seeing good results from the plan I have adopted, I have determined to pursue it in future, which is as follows:—I take 5 or 10 acres of my grass ground, meadows on which the grass begins to run out, and apply from 20 to 25 loads of unfermented manure to the acre, and plough it in as deep as I can make the plough run, say 7 inches, taking care to plough in the manure as fast as applied to the land, and, at the time of planting, put half a shovel full of rotten manure into the hill—in the absence of which I use ashes and plaster, a gill to a hill. I cultivate in the ordinary way, using the cultivator three times during the season, and hoeing as many times, leaving the ground as level as possible, and have never failed to raise, on an average, 60 bushels of corn to the acre. On six acres prepared in this way in 1849, one acre through the middle of the piece was measured, and it contained 204 bushels of ears; the whole piece was estimated to yield upwards of 75 bushels of sound corn to the acre. In regard to using unfermented manures, I differ from many good farmers, I am aware; but my own experience leads me to believe that, by applying it in an unfermented state, the strength of the manure reaches the crop at a time when it is most needed, that is, to fill out the grain, and make it produce well; whereas, by applying only rotten manures at the time of planting, the strength of the manure becomes exhausted before the grain comes to maturity, and in consequence the crop fails to produce well. It is, I think, necessary to apply a small quantity

of manure, or ashes, &c., to the hill at the time of planting, in order to give the crop a start, after which it will receive its principal aid from the long manures ploughed under and the decaying sod. The variety most in use, and which is most highly esteemed, is the yellow eight-rowed variety. A greater portion of the crop is used for fattening cattle among us, which is considered preferable to selling off the grains.

Oats are raised usually after corn, and produce from 50 to 60 bushels to the acre; average price, 45 cents per bushel. With this crop our lands are usually seeded to grass as follows:—Half bushel timothy seed, and 4 quarts clover, and on low and moist land the clover is omitted, and red-top is applied, at the rate of half bushel to the acre, with the timothy. The lands are then kept in grass from 5 to 8 years, or as long as they continue to produce from a half ton to two tons to the acre, after which they are again put in corn, as before. Many of our uplands, or "home lots," so called, are made to produce from 3 to 4 tons to the acre, at two cuttings, after which they are grazed closely until winter sets in.

Very little attention is paid to dairy husbandry in this neighborhood, farther than to supply our own immediate wants; considerable attention has, however, been given of late to improving our stock, several very fine animals of the Durham, Devon, and Ayrshire breeds having been introduced among us, and it has evidently improved our stock, though many farmers among us are unwilling to acknowledge that any improvement can be made by introducing foreign stock; but it is rather amusing to see these same farmers, who decry foreign stock, endeavoring to become possessed of the grade animals, at an advanced price. Whether they are, or are not superior to the native stock of the country, I shall leave with them to decide. I have, myself, a fine head of Devons, and am highly pleased with them. The grade animals are very superior, making excellent working cattle, and also good for the dairy and for beef. No attempts have been made by crossing the Devon and Durham with us, but I think, by crossing the two breeds, a great improvement might be effected, particularly if wanted for the dairy or for beef; but for working, should prefer the unmixed Devon. I have extended my remarks farther than I intended, but have omitted sundry articles of products, such as root crops, fruit culture, &c. Should the above statements be of any benefit to you, you are at liberty to make such use of them as you think proper.

I am, very respectfully, your obedient servant,

WM. L. COWLES.

Halifax County, Virginia, January 1*st*, 1851.

Sir:—The county of Halifax is one of the extreme southern counties of Virginia, on the North Carolina border, and is characterized by the same features as the adjacent counties of Pittsylvania and Mecklenburg. The staple agricultural productions are tobacco, wheat, corn, and oats.

Wheat.—The varieties most commonly sown are the early red May, the bearded golden-chaff, the white bearded, Mediterranean, and, in some few instances, the early purple-straw. The usual time of sowing is between the 25th of September and the 5th of November. Could I sow my whole crop in a single day, I would select the 10th of October. I have no hesitation in preferring the early red May to any other variety that I have tried. Of

one thing I am sure—that the late varieties do not suit our meridian. The rust is our great enemy. I have never had my wheat winter-killed, nor have I ever had any thing like a general destruction of crop from the ravages of fly; but I have seen whole fields destroyed by rust. I have for some years soaked my wheat in strong brine, or steeped it in a solution of blue-stone, at the rate of an ounce to the bushel. The brine is found, after repeated trials, not to be a cure for smut, and the use will be abandoned. The blue-stone is a preventive of this disease; and if the wheat, after being steeped in it 5 or 6 hours, is rolled in recently slaked lime, the cure is rendered certain. In this climate, where the frost does not destroy the wheat, a bushel of seed to the acre, in average land, is deemed sufficient. But there is nothing in which agriculturists differ so much as about the proper quantity of seed to the acre. Soil and culture determine the yield far more certainly than the quantity of seed—nature, in this instance, kindly repairs the mistakes of the husbandman.

Those among us who grow wheat after clover, plough the land with 2 or 3 horses, between the 10th of July and the 1st of September, as time and seasons will allow. I think the best cultivation is to break the land in the month of July, or early in August, to the depth of 6 or 8 inches, and then, with a small dagon with a single horse, to turn again just before sowing to the depth of 3 or 4 inches; then sow, and cover with a harrow drawn by 2 or 3 horses. In the county of Albemarle there are some respectable farmers who advocate and practise the single ploughing; but now the practice has disappointed me, and I have no hesitation in saying that the second ploughing will more than remunerate the additional labor.

My greatest yield of wheat was 33 bushels to the acre, from 11 acres. This was cut off from a field of 60 acres, on account of its being free from smut, while the remainder of the field was tainted with the disease. Probably the whole field would have averaged between 25 and 30 bushels to the acre. It is difficult, in such a climate as ours, to make the soil yield more than 35 bushels. If you fertilize the land to the degree necessary to produce this crop, such is the tendency of a warm climate to make woody matter and straw, that it is very apt to fall and smother the grain, or mildew it. That wheat, then, should be selected by us, which yields least straw. It will bear the most stimulus from the manure-pile, and the greatest yield may be expected from it. The red May is a wheat of this character, and it is the wheat from which I have received the heaviest returns on highly enriched land. The only objection to it, that I know of, is its liability to the frosts of spring. This may, however, be generally counteracted by grazing it down, when there is an early luxuriance. In 15 years I have sustained but one heavy loss from this cause, and I have used no precaution, save the one of not sowing till after the 10th of October. To state the average yield for the county is impossible; but I will hazard a guess. Perhaps 10 bushels to the acre, in average years, would be near the mark. Remember, however, that there is not a very large breadth of wheat, and the land is generally manured in which the wheat grows. The tendency now is to increase this breadth, by taking for wheat more corn land, and, while the quantity of wheat grown is evidently increasing, the average product per acre is evidently diminishing.

Corn.—The varieties in use are endless. I think that there is but little difference in the yield of acclimated varieties. The early kinds, which are importations from a northern climate, are more easily parched by drought.

The average yield might be stated at 33 bushels for our river and creek flats, and 17 for the uplands. Manure applied to corn in the spring, with us, often burns up the crop. It had better be applied as a top-dressing to the clover, and the clover turned in for corn, the fall succeeding the application: unless farm-yard manure be well rotted, it will, 3 years in 4, injure the corn to which it is thus crudely applied. In a cold, moist climate, like Western New York, the warmth derived from the manure while in a state of decomposition may greatly aid in forcing forward the corn; but it will not answer here.

We grow no barley, and but little rye: once we sowed a good deal of rye; but it is now a neglected crop. Beans are not a field crop with us. Peas are cultivated by some as an improver; but it is not much used in this way. On sandy soil, where clover will not take, it is doubtless an improver; but in all clay soils, clover is incomparably the better and the cheaper. Oats are generally and extensively cultivated. The crop is thought an exhausting one; but no good reason has been given for the opinion; and in South Carolina, I hear that it is looked upon as an ameliorating crop. Very little attention is here paid to the meadow grasses. Oats and the offal of corn are our chief resources for feeding our work-animals: Some clover is cut for hay; but not a great deal. Herds-grass, or the red-top, is our best and hardiest grass. The timothy does not flourish in our climate. Planters make milk, butter, and beef enough for family consumption; but none, or next to none, for market. We have not yet made our first cheese. Our cattle are, in the main, unrelieved by imported crosses, and no great account can be given of them. The same may be said of our sheep. Our hogs are pretty fair. We have tried the Berkshire breed; but, when weighed in the balance, they were found wanting. The Irish grazier, crossed in the old Virginia hog, has the largest amount of testimony in his favor. Our pork is raised at a high cost—100 pounds of corn producing about 25 of pork. But this corn is derived from the inferior part of the crop—the short and the imperfectly matured ears.

The leading crop of this county is tobacco: more is grown here than in any other county of the State. There is no new process of culture known to me. The present mode of cultivation, in the main, was in vogue before the American Revolution. That is, the new land, which is the land best suited to the crop, is prepared now and cultivated now as it was 70 years ago. We have sometimes deviated a little, but we are always compelled to try back. In curing the ripe plant, 10 years ago, we flattered ourselves that we had made some improvements; but even here we had to fall back on first principles, or rather primitive methods. It is true that we have better implements; plough and manure better; and have introduced clover as a rotation crop.

I have known 1100 lbs. to the acre made, in a crop of 50 acres; but the average would fall, if fairly stated, to 600 lbs. for the whole county.

No root crop is cultivated in fields; we have turnip-patches, but no turnip-fields. Our climate, particularly in the month of September, is too dry for the turnip. When the land is powerfully stimulated by manure, we sometimes make a great crop, but ordinary lands yield too discouragingly to justify its extensive cultivation. Besides, an idea prevails among us that it is a poor thing at last.

We have two varieties of the Irish potato—and but two—the watery and

the waxy. The sweet potato grows well, and often abundantly, yet for the last year or two we have failed, on account of our late, cold spring.

Guano is rather a stranger yet among us, but we are well acquainted with the magical effects of plaster—especially on clover. Lime is but little used, as we have no beds of it in this county. I tried it in three different kinds of soil, some years ago, at the rates of 20, 30, and 50 bushels to the acre. I saw no effect in the corn or the wheat, nor in the clover which followed them. The late Mr. Randolph Harrison, of Elkhill, gave me the same account of an experiment which he made with lime. I believe Mr. Sampson, of Goochland, made experiments with like results. That lime does act well in some soils, there can be no doubt; it is the veriest scepticism to deny it—but that it does not act well on all soils is equally undeniable. I believe, however, that the latter opinion now is, that the most important effects of lime are mechanical—rendering clays more friable, and sandy soils more tenacious. To produce this effect, it should be used very liberally, much more so than is indicated by my experiments, or the experiments of either Mr. Harrison or Mr. Sampson.

Fruit culture, though still greatly neglected, is receiving more attention than formerly. In the absence of a blighting frost in spring, we produce, in tolerable abundance, apples, peaches, cherries, strawberries, raspberries, and melons. We export no fruit of any kind. Our pride revolts against these petty sales and petty savings, while our necessities urge very strongly the duty of submission. What will be the end of the struggle, I know not.

Pears do not grow well with us, and the grape, from bad varieties, bad management, or unpropitious climate, yields a poor return. They rot, generally, before maturing.

Meteorology.—For three years, commencing with the 1st day of May, 1838, I caused a memorandum of the temperature each day, at 3 o'clock, P. M., to be entered in a book. This book is now in my hand. The thermometer used was Fahrenheit's; the position of it, a cool passage in my house, six miles south of our court-house. The result may be confided in as accurate, as the observations and the records were made with great regularity. I regret that there was but one observation for each day, and that they do not come down to the present year.

Here is the table:—

MONTHS.	AVERAGE, 1838.	AVERAGE, 1839.	AVERAGE, 1840.	AVERAGE, 1841.	AVERAGE, for 3 years.
May	67°15′	71°09′	69°07′	.....	69°10′
June	79 24	77 02	76 06	.....	77 52
July	85 37	78 42	78 38	.....	81 37
August	80 40	77 27	77 09	.....	78 25
September	70 48	73 15	69 48	.....	71 17
October	60 04	67 00	64 07	.....	63 44
November	51 00	48 08	51 42	.....	50 17
December	42 12	42 42	43 30	.....	42 48
January	.....	43 27	39 00	44°00′	42 09
February	.....	48 24	55 07	43 51	49 07
March	.....	56 20	58 42	54 39	56 33
April	.....	65 24	66 30	57 02	62 58

From this table we have the average temperature for three years, at 3 o'clock, P. M., a fraction over 62°.09.

I conclude with the expression of my hearty regret in being able to add so little to the value or the interest of your forthcoming report.

Very respectfully,

JAMES C. BRUCE.

Hamilton, Butler County, Ohio.

Sir:—In answer to your request, I submit the following remarks:—

Wheat.—The Mediterranean is the best that we have in Butler. I raise from 40 to 50 acres per year; the average crop is about 30 bushels. I seed about the last of September. I sow about one and a half bushels to the acre. I let my field grow late for wheat in the spring, when it gets a good crop of weeds, and then plough it under and let it lie till seeding-time, and then harrow it, and sow and plough it in, and harrow it. I believe that the average price is about 80 cents.

The best plan for raising corn that I know, is, after harvest, when the weeds grow up, to plough them under, and let them lie till spring, about the 15th of April, and plough it and cross it out 3 feet each way, and put 3 grains in a hill. I have raised 105 bushels to the acre. Our average crop is about 60 bushels per acre.

Oats yield about 40 bushels per acre—barley about 50 bushels. Barley does not injure the land, but it will enrich the land.

Grass-seed.—Timothy is the only grass that I sow, and it yields me about 2 tons per acre. It is the best to fertilize the land. I sow one gallon per acre. The average price, $10.

The cost of raising cattle till 3 years old would be about $10, and they would bring about $25.

Sheep.—Wool-growing is a poor business. The land is better calculated for cultivation, and we don't raise many sheep. It wants poor, hilly land, to make it profitable to raise sheep. I should say the large sheep was the most profit.

Hogs.—The best breed that I know of is the grazier and Poland mixed. About 30 bushels of corn will make 350 lbs. of pork; the average $3, and corn weighs 60 lbs. per bushel.

Irish potatoes.—Average yield per acre, 100 bushels. I plant them about the first of May. The orange is the best that I know of. I plant them in new ground, or manure them well in the hill with stable manure, or plant them in straw.

Very respectfully yours, &c.

JOHN CARR.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Locustwood, Taylor's Island, Dorchester County, Md., Nov. 1850.

Sir:—Your "Agricultural Circular" was received some months since, but, from a multiplicity of professional and other engagements, I have failed to attempt a compliance with your request until the present time.

I must premise what I shall hereafter say with the remark, that I can-

not possibly follow, *ad seriatim*, in reply to your interrogations, from the fact, that much information could not be obtained in this county, as no agricultural societies, or clubs, are now in organization, and farmers not caring to take the trouble to ascertain accurate results, by or from experiment, in manuring and cropping. This county is one of the Eastern Shore counties of Maryland; and, from its easy access by water, and its contiguity with the flourishing city of Baltimore, and the consequent large demand for lumber and fuel, this demand has, for the last century, engrossed the attention of the people, to the almost entire neglect of agricultural pursuits, and to the manifest impoverishment of the county, from the inevitable result, in exhausting all the timber, and failing to add any thing to the virgin soil, admirably adapted to manuring, but naturally thin in soil.

But the last ten years, I am most pleased to say, has been marked by a decided reformation in the farming operations of the county. Ten years ago, the most *primitive* agricultural implements were used. The common, and now universally used "drag-harrow," was then almost a curiosity among our people. Manuring was looked upon as an idle loss of time, and loss of outlay of money.

But now, how changed! Every farmer is striving, with commendable spirit, to outstrip his neighbor in the largest yield of crops, and, of course, in manuring, and in all the improvements in farming utensils, machinery, and all that pertains to good farming; and the beautiful result is—

"The desert buds and blossoms like the rose!"

As an instance of the improvement and the result, I will but mention that of the farm of Samuel K. Travers, Esq., of this county. This farm contains about 100 acres in cultivation; the average yield of the wheat crop for the 50 years next preceding 1840 was about 150 bushels; since 1840, that gentleman has been a pioneer in manuring and improvement in farming; and the present, in last harvest, (1850,) the same farm has yielded 850 bushels of superior wheat—indeed, of such an excellent quality, that some 800 bushels were sold for seed, for all parts of our county. Many others are pushing on the race of improvement, with a like most cheering prospect; and really *we* cannot help but think, that failure in the *pine wood crop* has eventuated beneficially to the farmer, especially the lazy one, as it has driven him to better things.

And now of the WHEAT crop for 1850. The prospect in May and the early part of June was never equalled before in this country; the winter had been quite open, with unusual quantity of rain, and the wheat plant came out of the winter strong and flourishing: the spring was very favorable to the growth of wheat, and, like the winter, much rain fell: hence, the cheering prospect to the farmer. But, alas! like many human things, the hour of blight came. About the latter part of June, that one of the most malignant of all diseases to the wheat crop, *rust*, began to make its appearance, and, in a few days, thousands of acres were rendered almost a total failure, very few fields being entirely exempt from the blight. That which escaped most generally was, I believe, the "Wicker wheat," (a new species in this country, of which I will say something more,) and the "German," owing chiefly, I am of the opinion, to maturing some week or ten days before most other species. It is also worthy of remark, that fields open to the wind blowing off or from bodies of salt-water, (sea-water,) were much less injured; and the same fields, the farther they receded from the waters, the more baneful the

effects of the rust. The result of our harvest has been a very large yield of straw, and a poor yield of indifferent, light grain. Of course, there are exceptions to this. And again, there are cases in which the crop was not cut, but left to the cattle. The price of wheat in Baltimore, our general market, has ranged for "family flour wheat," from $1.12 to $1.35 "per bushel," and inferior from 75 cts. to $1.12 per bushel, of 60 lbs. weight: the range of the Baltimore wheat market has been more uniform for 1850 than for many years preceding.

I regret to say, many adhere to the old and much-to-be-condemned rotation of seeding corn ground as the whole or principal crop: in this mode, wheat is badly put in; in ground already exhausted by the corn crop, the wheat, by this custom, is put in by sowing the wheat upon the ground, without previous fallowing, many times among weeds 2 and 3 feet high, and then an attempt made to plough, or, properly speaking, to scratch it in. This is generally done in October, the quantity sown about 1½ bushel per acre. The more improved way has been considerably brought into practice, and is increasing, of fallowing in August, and seeding in September, and with decided increase in yield; in many instances double. Our harvest commences sometimes as early as the middle of June. Upon the whole, I can congratulate our farmers on the decided and rapid improvement they have made. The wheat most common in use was known here by the name of "Lawler," a small but heavy white wheat, yielding but poorly; the "Taliaferro" has also been extensively sown. The "Thimble" is also quite popular with some. "Crate," another species, is celebrated for its large yield; but that now most sought after for seed is a species introduced by myself in this neighborhood, and now through the county, which I have named the "Wicker wheat;" it came originally from Virginia—the James River country, I believe—and is justly esteemed one of the best species ever known in this region. It is very large "grained," a plump, heavy, *and a rich white*, rated by wheat merchants in Baltimore, when thoroughly cleaned, and free from impurities, as "A. I. No. 1 family flour wheat;" it also has the great advantage of ripening early as any of the early species; and in the last crop, was decidedly more exempt from rust than any species, perhaps except the "German." I believe, in a few years, from present indications, it will supersede all other species in this county. I would but remark, it is beardless, and the chaff of a *red-brown* cast, and when machined, entirely clean of "white caps," a *desideratum*.

Corn is extensively grown, and, until the last ten years, the great staple with the farmers here, the mode of cultivation being decidedly better than for wheat, and the yield better per acre in comparison. Some idea of the importance of the corn crop may be formed, when it is a fact that it is the main article, and in many instances the only article, for subsistence, for master, slave, horse, cow, oxen, hogs-feed, poultry. Some portions of our county will not produce wheat. Then it must be the "staple." The provender is, in nine cases out of ten, the only dry food on which our horses or cattle are fed. Meadows we have none; and few, I believe, have yet cut clover for hay. I know, for myself, I have frequently been compelled to purchase hay in Baltimore for my horses and cattle, when my stock of corn-fodder was exhausted in the spring. By the way, I believe there is nothing superior for horses to well-cured corn "blades." We have the most improvident custom of feeding our corn. In nine cases out of ten, it is fed to horses and cattle whole, and on the ear; hogs are fed and fattened

in the same wasteful manner; the provender is fed in the same way, without any preparation, just as it comes from the field. The varieties planted are so mixed, that I know of no distinction but "white" and "yellow," except in a few cases of experiment, by *amateur* farmers. The mode of feeding corn in this region calls loudly for a change and economy; some day will demonstrate to our farmers this fact.

Oats in small quantities are sown, and appear to yield well; but most farmers have a prejudice that they are very exhausting to the ground. Yield, some 30 to 40 bushels per acre.

Clover is sown to some extent; and, where the ground has been limed, grows luxuriantly: producing most excellent pasture, and improving the crops, when *turned in green*. I believe there are few instances where it is cut for hay.

Dairy husbandry is at a low ebb; and nothing can prove this more conclusively, and not much to the praise of our farmers, than the fact that a large proportion of the butter for farmers' families is brought from Baltimore. This should not be in any farming district.

Neat Cattle.—The great objection to a large proportion of our cattle is, they are *too neat*, especially in March. This is a branch of husbandry that is shamefully neglected: arising mostly from the farmer attempting to keep too many, and in being then exposed in all weathers in the winter, with a short allowance of food.

Orchards and *fruits* of all kinds have been greatly neglected; very few persons or farmers producing even the common apple later in the season than Christmas—those used after that date being procured from Baltimore, the growth mostly of the Eastern States. There is, however, more interest felt on this subject, and of late years many have purchased from distant nurseries choice fruit-trees.

Manuring.—The most valuable article for improving our lands is of the *calcareous* kinds. Stone-lime is very largely employed of late years, and with the most satisfactory results. Oyster-shell lime is also in high favor, and by some yet preferred, when the shell can be procured large and thick. Beyond a cavil, this species of manure must be the basis of permanent improvement in our lands; then followed with the *high-pressure* manures, as guano, ammoniacal salts, and the results are truly wonderful. The mode of applying lime here is, to spread it broadcast, immediately after the corn is planted, averaging from 50 to 100 bushels per acre. This plan has the advantage of incorporating the lime thoroughly with the soil, in the cultivation of the corn crop. The first year after the application, very little can be realized in the crops. Another mode is to spread the lime broadcast upon the earth, at least one year before ploughing or cultivating, and thus permitting the lime to act upon what vegetable matter may be on the surface. Those who have tried this plan speak highly of its efficacy, and prefer it to the former mode.

Guano.—I have been using for several years this article on my wheat land, and, I think, with more profit in the yield than any other. I am of the opinion, Peruvian guano, at $40, or even $45 per ton, is the cheapest manure for our lands. In the autumn of 1849, I applied one thousand pounds of Peruvian guano upon four acres of ground, (previously in corn,) upon which I sowed four bushels of Wicker wheat. From this I harvested *one hundred* bushels *pure heavy wheat*. The last time previous, the same ground, when seeded in *wheat*, yielded some 5 bushels per acre by

average. No other manure had been used between the crops of wheat and a crop of corn taken off. Here is a striking experiment that it will pay. Compare the results, and I am fully of the belief that my ground is at *this time* more benefited from the dressing of the guano than the original cost of the article. Just so far as the guano extended, so far a heavy coat of clover is now flourishing luxuriantly.

I must conclude these hasty, disjointed statements, with the remark, that I regret some more competent writer had not undertaken the task. They have been thrown together at various times, and are but a bare *statement of facts*—an attempt at nothing more. I hate apologies, but in looking over what I have written, I am compelled to say thus much.

Respectfully,

WASHINGTON A. SMITH, M.D.

Virginia, Buckingham County, December 10*th*, 1850.

Sir:—I now proceed to reply to your circular, and fear my limited information will not be satisfactory to the department, as it is not even to myself.

Wheat is seeded upon fallow land from 15th to 20th September, with about 5 pecks to the acre. At that time corn is safe to cut and put up in stooks, or hauled off upon the stalk to the granary, which is much the best management. Where the teams are adequate to harrow in, (which ought to be double,) plough and haul the corn. Our corn land is flushed with the barshares, seeded with one bushel to the acre, and double harrowed. Seeding our tobacco land is often delayed by a late crop of tobacco; as soon as that is off, the ground is ploughed with barshares, and seeded with six pecks to the acre; for the reason that the land is more fertile, and being later in the season; besides, we expect a better reward, as any and every crop grows well after tobacco. For several preceding years, tobacco brought a very low price. Pending that season, a much broader surface was laid down in wheat, but will be much curtailed by the advanced price of tobacco. This is the most general rust year perhaps ever known, and seems to silence a long entertained opinion that rust is produced by frequent showers alternating with a hot sun. We had no showers, and believe the drought was very general previous to and at harvest; therefore, the showers seem not a necessary element, and that it is fairly ascribable to a hot sun. The general weight is from 25 lbs. to 57 lbs. the bushel. The average crop of Middle Virginia has been given for several preceding years. It is now more uncertain, and would seem unfair to give an average of this very important crop. We are experimenting largely with Peruvian guano, ploughing it under 7 or 8 inches, seeding and harrowing in the wheat. This depth is thought necessary, for the rains and snows to reduce its caustic property before the roots of the wheat reached it. I applied, the last year, under wheat and oats, 100, 150, and 200 lbs. to the acre, and have decided in favor of the latter quantity, and applied that quantity the present year to my wheat, and will next spring apply that quantity to my oat crop, and two pennyweights under a hill of tobacco, which I tried last year with success. Under corn, it did not equal my expectation. Upon oats its action was better than wheat. Its durability in aiding a subsequent crop, I believe, is yet to be ascertained, other than

a clover crop. It may give that a stand, which would not take upon exhausted land. At present prices, we cannot afford to buy and apply it to good land. A portion of the guano is carbonated, and requires pounding down; indeed, the finer particles, from dampness, has become clotted, and require rushing during the process of pounding and riddling; for there are small stones in it. I have seen them that would weigh 3 oz. The ammonia, a principal element of its fertility, is constantly escaping: also, when strewn before the plough, cover it in. To prevent this waste, I add plaster, measure for measure, when I pound it. Liebig informs us that plaster acts by combination. I also add top-soil, which damps the mass; but frequently sprinkle it with water, to prevent its dusting off when throwing it before the ploughs. This process of preparing and applying guano I deem important, as it prevents great waste. As to edible roots, their cultivation is limited to family supply. Our great reliance for bread, and food for stock, is corn, (maize,) which in good seasons yields from 15 to 40 bushels; say an average of 20 bushels the acre. We plant the first of April, upon lands well ploughed and well harrowed; planting deep, and covering about two inches—pressing the broken land above the planting, rather than under it. Corn is a hard drinker, and should be ploughed deep to get moisture in drought, and stands up in storms much better. When fairly up, we pass a single coulter each side of the corn, rather bearing the point under the corn. When 6 to 8 inches high, run a barshare, with the bar next to the corn, throwing the earth from it. When it begins to joint, plough well with the barshare, returning the earth to the corn, having previously thinned it, then weeding, pulling a small hill to the corn, as a large hill is no benefit to it, and very injurious in seeding wheat; after which, upon the appearance of a young crop of grass, run over with the cultivator, which will destroy the grass, leave a close level surface, retentive of moisture, and favorable to seeding wheat, preventing wash and a deleterious action from the sun. If these operations are well done, and at the right time, it is as much cultivation as corn requires. It is a question with many, whether suckers should be permitted to grow or be jerked off. I am in favor of the former. They will yield fodder, and, occasionally, a nubbin on the tassel. When taken off, the roots of the mother-stalk are often ruptured, and the wounds bleed much sap, until they heal up. A redundancy of nutrition produces suckers; to prevent them, plant your corn close.

In this section of Middle Virginia, tobacco is the primary crop, and we are rather to be estimated as planters than farmers, although we lay in largely for wheat, which rewards us well when exempt from all disasters. I estimate the tobacco crop at 800 pounds net to the acre of 4000 plants; the bottom leaves, and others imperfect, are called lugs, and worked up by the manufactories at about half-price. It is the most laborious crop in the whole vegetable kingdom, and, if its cultivation depended upon white labor, but little would be cultivated, and yet our slaves are fond of working in it; owning the labor, we find it the most profitable crop. The price depends much upon its quality, and that depends much upon capricious whim and fashion, to suit the various European markets. Sun-curing had its day, and commanded very high price, by the manufacturers being exempt from smoke, which was deemed offensive to the stomach of those with dyspepsia, now the prevailing disease of the country, from over-eating, late sleeping, and spending the balance of the day in idleness. That mode is now pur-

sued by but few: curing by steam is entirely abandoned. I believe that a good rich tobacco cannot be made but by the direct application of fire under it, applying, at the right time, a proper degree of heat. Upon this process of curing tobacco it may be thought that I am too tedious, but believing that some information will be given to my brother planters in this and other tobacco-growing States, is my apology. First, be sure that your tobacco is ripe: to ascertain that, view the top leaf on the north side of the plant; if the yellow (the oil) is down to the point, it is ripe; cut sticks and scaffold, 8 large and 10 smaller plants to a stick; scaffold close and strong; sun will cure it green before it yellows; yellowing is a separation of the water and oil; the sun has opened the mouths of the leaf vessels; when the water weeps out imperceptibly, and the oil retained in large yellow spots, generally 5 to 6 days, (dependent upon a warm sun and a damp atmosphere,) it is ready for the house; give 8 inches space between your sticks; let it hang a day or a night before you apply fire; 3 fires are enough to a house 20 feet square—half-seasoned wood the best; tie a thermometer to the lower tier-pole, in the centre of the house—the heat draws to the centre; tie a thread at 85°; a negro can see when the mercury is up: the house being cool and damp, will bear that degree of heat if raised very gradually; in 24 hours, the tails will curl about 4 inches, when the heat may be forced a little, say 2 degrees, and kept up regular 3 days and nights. The leaf ought to be cured—be sure of that, by examining above joist—before you raise the heat to cure the stem; above joists (it does not cure as soon as below) the leaf must be thoroughly cured, before you raise your heat to 120°, to cure the stems: the water is evaporated, the oil retained, the the mouths of the vessels sealed up; there is no danger but by a blaze communicating with the bottom tier; you cannot burn a dry bundle of tobacco, enveloped in sparks of fire. If heat is rightly applied, the bottom tiers will be the best, because cured by a dry heat; as the heat ascends through the different tiers, it becomes vapor, warm enough to force out water, and not hot enough to dry it off, when it drips down on each side of the stem, scalds and kills the tobacco, and is what the planters call house-burn. And estimating the worth of the labor, from the seed-bed to the press of the tobacco, I put it at $20 per acre.

I received, from the Patent Office, 3 half-pints of wheat, called Chinese, Polish, and red-straw; the latter is a very early wheat; the Chinese, bearded, very lofty, with a fine large grain; the Polish, smooth head, white large grain. I hope to acclimate the latter. The next crop I will give you a more detailed result. I have about one bushel now flourishing under drill culture; also I raised some seed of the Osage orange, but none vegetated; supposed they were not of the preceding year, as I learn old seed will not come up.

Barley is not cultivated at all; having no breweries, there is no market for it. *Rye* is preferred, as giving the best yield; like all new and novel things, sold at $4 the bushel; now at $1, or even 75 cents.

Our fathers were careless as to good fruit. The old seedlings have died out, been cut down, and replaced with the best kinds of grafted apples, peaches, plums, pears, cherries, &c. This is a good climate for native grapes; some of the foreign kinds succeed tolerably well in good seasons. I have a little vineyard of one acre, containing 600 vines; have made some wine, which was esteemed good. I have been manuring with the vines from pruning, which is slow in decomposing; I am now applying guano in solu-

tion, from the wash of my guano bags. I am constrained to remark the neglect of our people in not raising the vine, the fine fruit of which adds greatly to the comfort and enjoyment of a family. I find it very uncertain propagating vines by cuttings, and wish to know whether two prunings, fall and spring, are best. I will thank any vine-trimmer for the information upon the two subjects.

We find mixed grasses succeed best in our meadows; timothy, herds, and red clover are most approved. The yield in hay, well saved, 1½ ton to the acre is about an average. The best top-dressing, applied in February, I think, is plaster and ashes, a bushel of each to the acre. Many of our farmers are experimenting with peas, mostly in our maritime counties, where the pea flourishes in a very sandy soil; they are sown broadcast in the corn-field, and harrowed in, 5 pecks to the acre, after the corn is laid by, and fallowed in in October as a green fallow, and wheat seeded; I learn it succeeds well: I have a little trial on hand, when I can speak more correctly, after the next wheat harvest. Peas, at 75 cents, and 5 pecks to the acre, are 90 cents. Clover, at $5.50, will sow 8 acres, say 68 cents the acre; a little the cheapest, and well-established as the great auxiliary to made manures, it must maintain its ground, and pea-fallow will be consigned to the tomb of the Capulets everywhere, except where clover cannot make a stand on sandy soil, which is where peas succeed best.

Your inquiries of raising neat cattle to 3 years old; the price, at that age; value of good dairy-cows, spring and fall; how many pounds of beef will 100 pounds of corn produce; will a given amount of food yield more meat in a Durham, Devon, a Hereford, than in a native animal?—Feeling an interest in these inquiries from their great importance, I will hazard opinions, with the view of eliciting information from others, better informed, and hope to see them in your next Report. First, to rear a calf till 3 years old, I estimate to cost $8, and, at that age, it would be worth $15. A good dairy-cow, with her calf, in the spring, is worth $25; in the fall, I would reduce her value to $17. The 100 pounds of corn, reduced to meal, with the like weight of provender, and that cooked, and fed to a grown animal, might give an increased weight of 5 pounds, say ¼ of an ounce to a pound of the grain.* Lastly, I believe all the improved breeds take on fat more readily than our natives, and that the Durhams more kindly than either the Devons or Herefords, but they require more food.

Wool-growing has but recently commenced. We have two or three sheep-walks, to the extent of 4000 or 5000 head. Our climate and fine mountain-range are admirably adapted to the rearing of sheep. We farmers prefer the largest breeds, on account of mutton and wool, estimating quantity in preference to quality, it being manufactured into negro clothing. The price in our mart, Richmond, is about 30 cents.

To make good bacon, make your hogs really fat; the best food is corn-meal, cooked to the consistency of dough; if more liquid, and might be called swill, it would be better; but the waste is great; they are always fighting whilst eating, when the swill pours out at each side of their mouth. Make the dough up with red pepper-water twice a week—it is a fine condiment, especially after a gorge from over-eating, and they are very fond of it. After slaughter, let the animals cool, cut out, and salt; ground alum much the best to red pepper, pound it well in a mortar and mix with the

* Note.—Our correspondent should get 20 pounds of meat from 100 of corn or meal.—Ed.

salt; then rub it in well upon the skin side of the joints, when you will be astounded to see the quantity of salt and pepper that enters in through the pores; it requires hard rubbing, with the hog's ear in the hand—friction and heat open the pores. Pork derives but little benefit from salt on the flesh side; saltpetre makes the hams dry and hard, the pepper makes it red to the bone, sweet, and juicy; let it lie in a bulk to take salt, 4, 5, or 6 weeks, according to the weather, then shake off all the loose salt, clarify that by boiling and skimming—it will answer for stock; plaster well with ashes from seasoned hickory-wood—ashes made wet to stick; hang up, shank downwards; smoke with any sound wood except pine; reduce 100 lbs. of pork to 75 lbs. will be good bacon. If you smoke in wet weather, as is usual, it will give a black skin; in dry clear weather it will be a fine yellow skin. I never take down and pack away in corn, bran, and other things, as many do; my bacon hangs till I cut down the last piece to cook; and I have had it to hang 4 years, as sound as a roach, when you could chip it off and eat like dried venison—but much richer. To guard against the skipper-fly, I make a smoke 3 times a week either of red pepper or trash tobacco, which is offensive to them, through May to middle of June, which seems to be past their egging season. See that your door fits tight; if not, tack list around; they are not fond to enter dark places; when you open the door to give out for dinner, close the door after you. Now for cooking a ham: it requires soap to wash off the ashes; place the ham in cold water in the pot, to remain 30 minutes; when put over a slow fire, to commence boiling gradually with small blubbers; lid upon the pot to retain heat; force no more by increased fire—you have got the boiling-point, and can make the water no hotter; but a violent agitation from increased heat to make the pot boil over will drive the juice out and make the ham hard and dry; skim the pot often, and keep on the lid. Now for the time of boiling a ham: for every pound it weighs, boil it for so many 15 minutes.

I am glad to hear that Congress has directed 130,000 copies of your Report to be published—regarding it the most valuable document published by Congress—which is all they do in favor of the great agricultural interest, which is the base of every avocation in this life, and is more neglected and disregarded than any other avocation in the whole civilized world. This is not as it should be. All which is very respectfully submitted, and, from its great length, may require you to curtail it.

Very respectfully yours,

CHARLES YANCEY.

Spottsylvania County, Virginia, December 31*st*, 1850.

Dear Sir:—Your circular, dated August last, came duly to hand.

1st. In regard to the wheat crop, I will say that the soil through this region of country, about the head of tide-water, has been considered not well adapted to the growth of wheat; consequently our farmers have not turned their attention so much to the production of it until within a few years past. The quantity seeded has been gradually on the increase, and, from manuring and improved culture, the product per acre has gained from year to year, nearly to double that of former years; the last harvest particularly, and, in some instances, where guano was used at the rate of about 200 lbs.

to the acre, the product trebled that from the same land raised in any year previous for the last 20.

The average product from improved land without the aid of guano was about 12 bushels per acre, and upon guanoed land the highest average per acre, through the field that I have heard of, was 17½ bushels, and the lowest 13 bushels. I will add, that much the larger portion of the guanoed land seeded to wheat could not have produced much more than the quantity sown upon it without the aid of the guano; and again, the quality of the grain was so much superior that the merchants and millers of Fredericksburg have said that the wheat raised in this and one or two of the lower adjoining countries, principally from improved and guanoed land, was less injured by the rust, and of better quality in all respects, than any offered in their markets this year. Clover seeded upon guanoed land stands well, and presents a good appearance.

The usual mode of applying guano to the wheat crop with us is to sow it upon the land without mixing with any thing else, turn it under with a double plough from 4 to 6 inches deep, sow the grain immediately, harrow in well with a heavy harrow in the same manner as wheat put in without the guano, when it follows the corn crop; the cornstalk and all being removed from the field before the plough: this is done in all the month of October.

Fallow ground is ploughed generally in the month of August, and seeded about the last of September, and the average quantity sown in either case is about 1¼ bushel to the acre. The semi-bearded wheat is the principal favorite with our farmers. The Poland has been introduced, and was harvested in our last crop; it yields finely, probably exceeds any other variety we have had, but, from its exceedingly rank growth of stalk and blade, I think it will be very apt to take the rust, and consequently will not suit this lower country so well. Harvesting commenced with us this year about the 25th of June—this is rather later than usual. The best remedy against the weevil is to thrash as early after harvest as possible, and put your wheat up in the chaff. Pens made of rails, with the floor raised from the ground, so as to keep out the dampness and let the air pass underneath, and well lined at the bottom and sides with straw, are used for this purpose by some of the farmers; and, if covered so as to keep out the weather, will keep wheat in the chaff for months without the slightest injury.

The average price obtained for wheat at our nearest markets, this year, has been about $1.07 cents per bushel.

We are almost surrounded by railroads and water improvements; our own roads, are, however, naturally fine, and we have an easy access to markets.

Corn.—This is our best established crop—not so, however, from its great average yield or profit, but owing to the peculiarity of our soil. Its preparation for this crop is easy, and the culture simple; so far as experience teaches, deep ploughing, as well in the preparation of the land as in the cultivation of this crop, is in all respects the best.

The ordinary preparation for the corn crop, as practised by most of our farmers, of throwing their lands into narrow beds, I think injudicious; especially so, when it is to be followed, as is usually the case here, by a crop of small grain: it never produces as much, and the corn, although it grows off and makes a little better show in the early part of the season, when planted in this way, it is more liable to suffer from droughts, and never ears out so well. My last crop of corn was made upon land prepared by a fallow, from

6 to 8 inches deep, (without bedding, except the wet spots,) and at planting-time, a large harrow was run over it, to break the clods and close the furrow-seam, to keep the grass from coming up. The ground was then furrowed off horizontally, and about 4 inches deep; the corn was planted, and as soon as it was well up, I commenced culturing about 8 inches deep, running on either side, and as near the corn as practicable. This was followed by the hoe, brushing away the clods from the corn, and adding a little fine dust when necessary. Through with this operation, say about the 10th of June, the corn was large enough to thin, and receive the dirt which was thrown to it, and completed its cultivation.

The yield was about double that produced from the same field 4 years since, when the cultivation was about the same, but the land was prepared by throwing it into narrow beds, as spoken of above.

The small grain crop usually follows the corn crop immediately after, sowing oats upon the most indifferent parts. The land is then permitted to lie idle, or, as the common phrase is, turned out, for 2 or 3 years, when it is again brought into cultivation, and the same routine followed up. It may be well to observe that much land in this section of country has been "turned out" and abandoned as being worthless, rendered so by bad and often repeated cultivation, a good portion of which has grown up in broom-sedge and pine, and some of it is still being cultivated, or rather *teased to death*, to procure a subsistence from it, but the product is so small as not to be worthy of notice. The pine upon it, however, is an inexhaustible source for fuel, and is profitable as such when contiguous to market.

The average yield of corn per acre on good land with us is about 20 bushels, and some of the farmers bordering on watercourses, particularly those in the valley of the Rappahannock, produce a yearly average yield of 50 bushels to the acre. A white corn, known with us as the twin-corn, a species of the Baden, is mostly cultivated. I have known, from good land, when the season suited, as many as six good ears gathered from one stalk of this corn. Another kind, somewhat similar to the old-fashioned gourd-seed, is now being introduced; it yields extremely well. The cob of this corn is small, and the grain very long and deep, and some of the ears produced in this vicinity, the last crop, counted upwards of 1200 grains to the ear.

I know of no experiment made, by which I could give the quantity of corn produced from application of a given quantity of manure, over and above the ordinary yield from the same land without it. The average price of corn in our markets is about 60 cents per bushel.

Oats are also produced for horse-food; they usually command, when sold, about 30 cents per bushel.

Tobacco is also raised with us, and our soil is pretty well adapted to the production of the finer kinds; the Orinoco is mostly planted, and yields about from 1000 to 1200 pounds per acre.

Peas and *beans* are only produced for family use; occasionally a few bushels for market.

Our farmers grow neither flax nor hemp, but almost every one produces cotton in quantities sufficient for all the family purposes, and it is for the most part manufactured at home, during the inclement seasons, by the female servants, or else it is carried to the factory, after being seeded at the gin, and exchanged for the manufactured article. The cotton-patch is continued in the same place from year to year, and manured principally with ashes

in the hill before planting. About the 1st of May is the time for planting; and one of my old and experienced neighbors informs me that he has known as much as 250 pounds produced from an acre of clean-seeded cotton.

Wool-growing is only extended to the supply necessary for family use. Our sheep are of the native stock, and subsist through the winter (unless a great fall of snow) in good order, with but very little foddering. After supplying the table plentifully, we generally have muttons and some lambs for sale every year. This is not a grazing or a cattle-growing region, except for the necessary supply of the farm; some of our cows, though small, are fine milkers, and butter is produced for sale to some extent, by almost every family, and a good article usually commands about 20 cents per pound, the year round.

Pork is raised also for family use only, and the best hogs that I have seen have been produced by a cross of the Parkinson with Berkshire.

Orchards are not as well attended to now as formerly, when they were more profitable in the article of brandy distilled from the fruit. All kinds of apples, except the winter pippin, however, grow well here, and obtain a fine size and exquisite flavor. Very few are marketed, but merely fed to the stock, dried, and made into vinegar. I think the crab-apple would be profitable made into cider; our best article of crab-cider usually sells for 20 cents per gallon by the barrel, but I do not know that a large quantity could be sold at that price.

Yours, respectfully,

JAMES M. NALLE.

P. S.—I have usually kept a memorandum of the advance of the planting season, noting its forwardness or lateness, one year with another, and other matters connected with farming in that way, but have not time to add it now.

Yours, J. M. N.

Fort Madison, Lee County, Iowa, December 17th, 1850.

Sir:—I have received your Agricultural Circular, and herewith furnish some information in reply to the questions annexed to it.

Wheat.—Varieties in use for fall sowing are red-chaff, bearded, and smooth, red and white-chaff, velvet, and Siberian. Red-chaff bearded is best. Wheat is always a sure crop on sod. Average produce per acre is about 18 bushels. Time of seeding is from 1st September to 1st October, and time of harvest from 27th June to 15th July. A few farmers prepare their wheat for sowing by steeping it in strong brine, and then rolling it in lime. It is thought that wheat thus prepared is not so liable to be injured by the fly, and that the preparation acts as manure. Quantity of seed used per acre is 1 to 1½ bushel. Plough once on sod ground, and twice on stubble, 6 inches deep. No perceptible diminution of crops. There is generally no rotation of crops, but farmers endeavour to put in corn after small grain. They are beginning to use clover for the purpose of manure. No weevil in wheat here. Average price per bushel for 1850, about 63 cents. Yellow corn most esteemed, ripens soonest. White corn yields more, but ripens later. Yield of yellow, about 45 bushels; yield of white, 55 bushels per acre. Cost of corn, from the seeding to the crib, is about 7

cents per bushel. Best mode of cultivation is to plough well and deep. Best mode of feeding is to have the ear (corn and cob) crushed and fed raw. Average price here for 1850, about 25 cents per bushel. Oats yield about 40 bushels per acre. Quantity of seed per acre, 2 bushels. Barley yields about 15 bushels per acre. Quantity of seed, 2 bushels per acre. Rye, average yield, 25 bushels per acre. Seed sown, one bushel per acre. Barley is least exhausting to the soil. Beans and peas cultivated only as garden vegetables. There may be a few exceptions.

Clover and Grasses.—Quantity of hay per acre, about 3 tons. Some plaster used. Stable manure the only kind in general use. Kinds of grass used are timothy and clover. Quantity of seed per acre, about a peck of timothy and clover seed, (chaff.) Hay is the most profitable crop that a farmer living near the Mississippi can raise.

Dairy Husbandry.—Annual average produce of a good cow is about 200 lbs. cheese and about 200 lbs. butter. Average price of butter for 1850 is 10 cents per pound, and that of cheese, 7 cents. Old-fashioned churns generally used. Neat cattle cost but little till 3 years old; feed about barn and stack-yards. Usual price of native animal, 3 years old, $15 to $20; good milch-cows, from $12 to $24. Very few Durhams here, but the number is increasing. They will yield much more meat with same amount of food than the native animal.

Sheep and Wool.—Wool-growing is profitable; large sheep more profitable for fleeces and mutton than small ones. Costs but little more to grow Merino wool than native. The proportion of lambs annually raised to the number of ewes is about 1 to 5.

Hogs.—Best breed is the China and common, crossed. Berkshire not so highly esteemed as formerly. Only method of raising hogs here is by feeding them corn in pens and small fields.

Cotton, *sugar-cane*, *rice*, *hemp*, none raised. Tobacco, a little raised in gardens. Root-crops are on the increase. Potatoes, a few sweet raised, and do well, especially red ones. Of Irish potatoes, the Neshanic is the best kind for table and market. The red potatoes are most prolific. Average yield, 200 to 400 bushels per acre. Cost of production, not more than 10 cents per bushel. Best system of planting is in hills. Plough twice and hoe twice; about 10 bushels seed per acre. Rotted straw manure improves them. Not much used. Fruit culture is receiving great attention. Not enough apples grown at present for home consumption. A few grapes, grown in gardens, do well, and rapidly increasing.

Manures.—Lime and plaster but little used. Soil here new and rich. Guano not used. Wherever manure is applied, it increases the crop, especially grass.

Meteorology.—See accompanying abstract, prepared by Daniel McCready, Esq., to whom I am indebted for much of the information contained in the foregoing answers.

Very respectfully yours, &c.

EDWARD JOHNSTONE.

Abstract of Meteorological Observations, made near Fort Madison, Lee County, Iowa, for the Year ending November 30, 1850.

Months.	Monthly Means.	Highest Temperature.	Time of Highest Temperature.	Lowest Temperature.	Time of Lowest Temperature.	Range.	Quantity of Rain.	Quantity of Snow.	Prevailing Wind—Course from.	Days on which Rain or Snow fell.
	°	°		°		°				
December, 1849...	21.94	50	Noon, 19th	8	At sunrise, 17th	58	.10	6.00	S. E. and N. W.	December 18, rain; 7, 12, 16, 22, snow. Total snow in 1849, 20 in. Total rain, 56.70 in.
January, 1850.....	28.99	48	10th	4	4th	52	1.05	8.75	N. W. and S. E.	January 15, 20, 23, rain; 6, 7, 14, 17, snow.
February	29.83	58	27th	12	3d	70	.80	1.05	N. W.	February 7, 27, rain; 1, 17, snow. Ice broke up in river, 19th. First steamboat up, 25th.
March	37.28	66	13th	14	11th and 24th	52	1.65	1.00	N. W. and S. W.	March 5, 12, 16, 20, 22, rain; 2, 22, snow.
April.....	44.66	80	26th	24	13th and 14th	56	4.90	3.00	" "	April 1, 2, 3, 4, 5, 11, 17, 21, 27, 28, rain; 3, 4, 12, 16, snow.
May	58.66	86	13th and 16th	30	1st	56	4.70		" "	May 2, 3, 6, 7, 20, 22, 23, 24, 25, 26, 27, rain.
June.....	73.12	92	17th, 21st, 26th	44	1st	48	4.90		S. W.	June 3, 5, 6, 13, 20, 26, 27, 29, 30, rain.
July.....	77.29	100	9th	55	17th and 18th	45	6.55		S. and S. W.	July 1, 6, 11, 12, 19, 28, 30, rain. Wheat harvest commenced on the 4th, and finished 13th.
August	75.47	98	3d	52	26th and 28th	46	9.15		E. and S. E.	August 10, 11, 16, 19, 21, 23, 29, 30, rain.
September.....	64.60	86	25th	40	7th and 29th	46	6.95		N. E. and S. E.	September 6, 9, 11, 12, 14, 17, 26, 30, rain. First frost, morning of the 29th.
October.....	54.05	82	16th	24	26th	58	2.55		N. W. and S. W	October 1, 4, 9, 16, 17, 30, rain.
November.....	43.21	68	1st	21	19th	47	3.12	2.40	N. W.	November 1, 2, 4, 5, 10, 14, 25, 27, rain; 15, 16, 16, 21, snow.
Yearly mean....	50.75				Depth of rain and snow,		46.42	22,20		

The thermometer has a northern exposure, out of the direct rays of the sun. *Mean Temperature.*—This is the temperature as deduced from the daily observations during the year, at sunrise, noon, and sunset. The rain-gauge was a vessel of equal width at top and bottom, usually set upon the ground. N. B.—The thermometer is elevated about 6 feet from the ground. February 5th was the coldest day during the year; thermometer 12° below zero, and was not above zero all day. The greatest heat was on the 9th of July, from 12 till 2 o'clock; thermometer 100°. The 5th of July was the warmest day; thermometer, at sunrise 74°, at noon 94°, and at sunset 84°, being a mean of 84°.

DANIEL McCREADY.

Fruit Farm, Peoria County, Illinois, November 26th, 1850.

Sir:—The postmaster at Peoria has handed me your circular of the 26th August, with a request that I would reply to the queries in regard to fruit culture.

1st. "Is the culture of fruit receiving increased attention?" Although this is a new district, settled principally within the last 12 years, yet the culture of good fruit, particularly of apples, peaches, and pears, is receiving very decided attention. The number of grafted trees, planted in orchards in this county, must be more than 75,000. A considerable share of these have commenced bearing, and the result, thus far, has been entirely satisfactory.

The demand for young fruit trees is rapidly increasing, and the time is close at hand when there is likely to be more good fruit in this and the adjoining counties than is now to be found in any district of equal extent in the United States. The supply of young trees in the nurseries has heretofore been nearly equal to the demand; and there are now on hand and for sale, at least 150,000 in the county of Peoria alone. I can, therefore, answer your first query in the affirmative.

2d. "Cannot apples enough be grown upon an acre to render the crop a very profitable one to the farmer?"

The disposition to plant orchards, so universal in this district, indicates a general belief, that they will become profitable. In no part of the world do trees grow better than on the table lands of Northern Illinois; and wherever they have attained sufficient age, they are very productive, and the fruit of most excellent quality. The specimens of apples and pears raised in this vicinity, and exhibited at the great fair at Syracuse, N. Y., in 1849, were at once pronounced to be the best and the most beautiful of the season; and the same remark will hold good in regard to those exhibited at the State Fair, held in Cincinnati, Ohio, in October last. The table lands of the region, comprising, as they do, more than three-fourths of the whole country, are entirely free from the visitation of untimely frosts; and this probably accounts for the great productiveness of our trees. This happy exemption may be attributed to the absence of every obstruction calculated to impede the full sweep of the winds, which come in immediate contact with the ground, and thereby retard vegetation in the spring until the whole atmosphere becomes warm. There is about ten days difference between the starting of vegetation on the table lands of the prairie and the timbered district in the same latitude east of us; hence, we often escape the effects of a late spring frost, which often makes sad havoc in the timbered districts. For the above reasons, the apple and pear crops are about as certain with us as any other crop, and so it has been ever since the first trees of the early settlers came into bearing, (now about 15 years.) Another consideration in favor of the extensive culture of the apple in this district, is the fact that good winter apples, fit for exportation to a warm climate, cannot be raised successfully south of latitude 39° or 40°. Whenever a surplus beyond the home demand shall be produced, we have the great Southern market as an outlet; and, by having the best article, we can always control that market. Our cultivators, instead of being influenced by a narrow, monopolizing spirit, are anxious to see their neighbors go into the business, being confident that the more good fruit there is to sell, the

more profitable the cultivation of fruit will become. It is very difficult to make even an approximate estimate of the profits of an acre of orchard. The oldest plantation of apple-trees in this vicinity is now 22 years old from the seed. The best bearing varieties in it have averaged about 15 bushels per tree, or 600 bushels per acre, for the last 5 years. It is probable that for the next 10 years they will average 20 bushels per tree, or 800 bushels per acre. The present standard price for winter fruit is 50 cents per bushel at the orchard when gathered. With so large a market to the southward, where the apple never can be grown, we do not anticipate any material decrease in the price for a long series of years.

3d. We have no data upon which to make an estimate of the "comparative value of apples and potatoes, for feeding hogs and cattle." Indian corn is the universal article for feeding and fattening in this country, and where it can be produced so cheap, and in such profusion, nothing else is likely to supersede it for this purpose.

4th. "What varieties best to keep for winter use, and for exportation?" Being in the infancy of the apple culture in the West, the above are of necessity quite unsettled questions. There are some 200 varieties of late fall and winter apples now in the course of trial among us, many of which will be totally rejected, while a few only will meet the general approbation of cultivators. Among those which have been pretty fairly tried, and found well adapted to our soil and climate as winter apples, are the American Golden Russet, English Golden Russet, Flushing, Spitzenberg, Esopus Spitzenberg, Michael, Henry, Pippin, Milam, White Bellflower, White Winter Pearmain, Red Winter Pearmain, Wine-sap, and Fulton. Of such as are adapted to the spring market, the following have been well proved, viz. Green Newtown Pippin, Rowle's Jennet, Limber Twig, and Red Romanite, (Carthouse.) The celebrated Northern Spy has not yet fruited with us; the tree, however, grows well, and is hardy. The Fulton, above named, is a new variety, and is believed by many to be the best apple now cultivated in the West.

5th. "Do you know any preventive or remedy for the blight on pear and apple trees, or the yellows on peach-trees?"

The yellows has never made its appearance among our peach-trees, and of the blight we have had only two visitations since the settlement of the country. The first, in the summer of 1842; and the last, in 1850. In both cases, the disease commenced after a severe chill in the atmosphere, which had been preceded by very great heat and moisture. Its attacks were confined, in a great measure, if not entirely, to trees the branches of which were stimulated to the utmost, either by severe pruning, or high cultivation on a rich soil. Where the affected branches were removed soon after the attack, the disease did not spread over the tree; but, where they were suffered to remain, it spread from branch to branch, often doing great injury. Whatever may be the cause of the disease, it is certain that it will spread by infection unless the diseased parts be removed. I am confident that most of the injury done by the blight, in the years above named, was caused by a too free use of the pruning-knife before the malady commenced, and a too limited use of it afterwards.

6th. The transplanting of trees is an operation so simple, so easily performed, so free from mystery, it would seem that all the world might understand it. Yet, many who attempt it either fail in toto or in part. For the benefit of the inexperienced, we will venture to state some of the causes

of failure: 1st. In taking up a tree. If it is small, it is often pulled up; this strains and lacerates the roots. A tree should always be dug up, not pulled up. 2d. The work is often done with a dull instrument, and the few roots which remain are often bruised and broken. 3d. There is often an unnecessary exposure of the roots to the atmosphere. If properly handled, the most tender tree may be taken up, transported a thousand miles, and reset with safety; when a few hours, and, in some cases, a few minutes of needless exposure will destroy it. By dipping the roots in diluted clay immediately after being taken up, then wrapping them in moss or some other substance which will not ferment, and will retain moisture, they may be kept out of the ground long enough to be carried any desirable distance. This work should be done in the spring or fall, when the temperature is above freezing and below the vegetating point. 4th. Another very common error in planting trees is a neglect to pare off all bruised and diseased roots at the time of transplanting. 5th. And last, though not least, the bungling manner in which the earth is placed about the roots, sometimes being shovelled in upon them, and then trodden down. No man can be a successful planter of trees if he is too proud or too lazy to get upon his knees and carefully pack the earth among the roots with his hands.

7th. *Budding.*—This operation we perform as early in July as it is practicable to obtain mature buds. The stocks should be cut off (above the bud) in seven or eight days after the insertion of the buds. In this way, if the stocks are thrifty, we are sure to obtain shoots from 10 to 30 inches long the first season. The best stocks for budding are seedlings, transplanted at one year old, and budded the second summer after.

Grafting.—Most of the grafting done here is what is called root-grafting. This is done in a warm room, in the winter season, upon the roots of one year's growth, taken up in the fall, and secured from the frost. The stock of the seedling should be cut off, leaving with the roots about 3 inches, upon which scions of the same size should be attached, and firmly tied with a moistened corn-husk. They should then be packed in earth, in boxes 8 inches deep, with the points of the scions left exposed about an inch above the earth. In this condition they should remain in the cellar until warm weather in the spring, when they should be exposed to the light and heat. After they begin to expand their leaves, and to throw out roots, they should be taken from the boxes and transferred to nursery rows, where they push up a shoot 3 or 4 feet high the first season. It is a very good practice to take up root grafts the next fall after planting, and bury them securely during the winter, as they are tender when the growth is very great, and often suffer during a severe winter. This, however, is seldom done.

Grapes.—The experience thus far acquired in grape culture in this newly-settled country is of course very limited, yet we are not without hope of a good time coming, when pure wine will supersede the poisonous beverages now too much in use. The Catawba grows well, is hardy and productive, so far as tried. I have a vine on my premises, said to have been brought from the Rhine, which has produced a full crop of delicious grapes every season for the last ten years. This variety has been spread considerably over the country, and will soon be tried for making wine. The Isabella has proved to be a failure with us, except when trained upon walls. We have, in this vicinity, some seedling grapes from the valley of the Connecticut, which bear prodigious crops, the quality not first-rate. From the experience

thus far had, we have good reason to believe that the bluffs of the Illinois are as well adapted to grape culture as the hills in the vicinity of Cincinnati, where so much wine is made.

Yours, &c.

EDSON HARKNESS.

IRRIGATION.

No country has greater natural advantages for irrigating all improved land than the United States; and the time approaches when these advantages will be turned to a useful account. To encourage improvements by the aid of running water, which is always charged with both the organic and inorganic food of plants, in a greater or less degree, we give an instructive and suggestive article, translated from *L'Echo Agricole* of a recent date:—

Drainage and irrigation are measures of the highest utility in agriculture. Indeed, it may be said that all our agricultural energies should be devoted to this object. But works of drainage and of irrigation are not within the easy reach of everybody. They require a pretty considerable outlay, and special information; without which the result would be almost always uncertain. A company, offering every necessary guarantee, and devoted especially to undertaking works of drainage and irrigation, would be of signal service to the interests of agriculture. We have frequently been the medium of recording the desires of the agricultural body, in their appeals for the formation of a company of this description. The Central Society of Agriculture, after hearing an excellent report by M. Batailler, on the irrigation effected by him on his estate of Portail, near Montargis, expressed, in 1849, the same opinion and desire.

Such a company is now established. For a long time past, several gentlemen, appreciating the excellence of M. Batailler's system of irrigation, and carefully weighing the advantages afforded by drainage, have been engaged in the formation of such a company. We are now in a position to announce its definitive establishment, and publish its programme and regulations.

The director of this great undertaking, M. de Liron d'Airolles, chevalier de la Legion d'Honneur, and formerly a practical agriculturist, has just favored us with all the documents and necessary information for the purpose of replying, through the medium of the *Echo Agricole*, to the numerous questions which have been addressed to him on this subject. We will now place these documents before our readers.

"The object of the company is to carry out, in France, works of irrigation, on the plan of those so much admired in the plains of Lombardy and in Piedmont, and which, wherever they have been skilfully carried, have secured large profits to the proprietor of the soil, and comfort and prosperity to the people. The company will extend its operations, limiting them, however, within the extent of its capital, to all districts which offer the most profitable investment; and advantageous proposals have been addressed to it from all sides. The Committee of Management feel convinced that whatever may be the amount of capital at disposal, it will, for

very many years, be inadequate for the works which can be beneficially executed."

"*Data on the probable results of the operations.*—In many localities, the value of the soil has been increased tenfold by irrigation. But the company will ground its calculations on works executed under more ordinary circumstances, and under a climate which does not join the advantages of a high temperature to those of irrigation. Such an example presents itself in the works executed by M. Batailler, a landed proprietor, and formerly a pupil of the Polytechnic School, on his estate of Portail, near Montargis, where, by an expenditure of 600 francs the hectare,* (about £10 an acre,) he has transformed an arid and almost useless soil into rich meadow land.

"These results have been confirmed by numerous reports from the Inspector of Agriculture, and from commissions appointed by the agricultural committees, and by the administration of the department of Loiret.

"'The land on which M. Batailler has been operating,' say MM. de Sainville and de Montferrand, delegates from the Agricultural Society of Montargis, in their report of the 1st of September, 1847, 'was of very indifferent quality, and let at 10 francs the arpent metrique, or 20 francs the hectare,' (about seven shillings the acre.)

"This rental represents a capital of 700 francs; and it is notorious that these meadows, producing 1600 bootes† of hay, of the first quality, in two crops, are worth more than 4000 francs the hectare: being an increase of more than 3300 francs, a sum from five to six times greater than the capital expended.

"'To resume,' continue MM. de Sainville and de Montferrand, 'we think that the works executed by M. Batailler are well conceived and executed; and that the application of his system would be exceedingly advantageous in all situations where a sufficient supply of water and a suitable adaptation of the land are to be found. We do not, therefore, hesitate to propose that the gold medal offered for the best system of irrigation be awarded to M. Batailler.'

"The correctness of this example is further confirmed by the precisely similar results obtained, under a colder climate, in La Campine, the Sologne of Belgium, which have been published in a valuable work, by M. Mangen, engineer of bridges. 'The government works, and those of the Irrigation Society,' says M. Mangen, 'have already increased the value of some thousands of hectares of land, six or seven fold. There are also uncultivated downs in La Campine, which have been transformed into meadow land of the first quality, at an expenditure of 600 francs the hectare.' 'These are,' adds M. Mangen, 'remarkable instances of industrial companies engaging in agriculture. It is highly desirable that a large amount of capital should be employed in the same way in France.' We entertain no doubt of the success of this sort of undertaking, judiciously and honorably conducted.

"The above results are independent of those obtained by the aid of M. Batailler's system of liquid manure.

"MM. Dumas and Paine had long drawn the attention of cultivators to the advantages attending the application of copious irrigation with water, charged with some thousandth parts only of organic matter, as a means of

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* The "hectare" is 11,960½ square yards.

† The "bootte," weighs about 11 pounds English.

accelerating the progress of vegetation in an extraordinary manner. M. Batailler has responded to this appeal, and has succeeded in rendering these principles more thoroughly applicable than could have been possibly anticipated; for he not only makes practical use of all the fertilizing principles of *Flemish manure*, but he applies it to the land in irrigating streams in the exactly suitable proportions, without the expense of spreading; and, consequently, experiences no loss of gas and no offensive smell. This new process in irrigation has been unanimously approved by both practical and scientific men.

"1st. The Agricultural Committee of Montargis, which has inquired into M. Batailler's plan of irrigation on the estate of Portail, has awarded him a gold medal.

"2d. The Central Society of Agriculture, in its sitting of the 7th of February, 1849, recognised the special advantages secured by this method, and declared it deserving of serious attention. A member, M. Payen, cited the example of a similar system of irrigation, carried on in the plain of Issy, which produces four or five crops of hay, where, previously, only one was gathered.

"3d. The Society of Encouragement, in its second sitting of February, 1849, voted the publication of M. Batailler's paper, after a public and highly complimentary approval, pronounced by its president, M. Dumas.

"4th. The Jury of the Exposition has awarded two medals to M. Batailler; one from the report of the Commission on Chemical Arts, and the other on the proposition of the Agricultural Committee.

"5th, and lastly. The Council of Public Health, in its sitting of the 8th of March, 1850, impressed with the importance of the results obtained, recommended a grant to M. Batailler of the 30,000 metres of nightsoil reserved for such purposes by the city of Paris.

"The company, therefore, seconded by the most talented engineers and distinguished agriculturists, appeals confidently for the raising of its capital to the friends of agriculture, and to those who wish to employ their money in a manner most safe, the most beneficial to the country, the most productive of moral good, and its substantial advantages. M. Batailler has granted to the company the sole use of his system.

"We cannot do better here than to quote some extracts from modern writers who have treated on the subject of irrigation.

"*M. Mathieu de Dombastes.*—'Of all the improvements in the means by which the products of the soil may be permanently increased, there is, perhaps, none more important than irrigation; and yet the practice of this system has been, hitherto, confined to but a small number of the departments of France. It affords, in fact, a most striking instance of the slow progress made in agricultural arts of the most evident utility.'

"*M. Jaubert de Passa.*—'Who could venture to form a calculation of what the future has in store for France, if irrigation obtains a footing there, under the protection of the laws; if new and peaceful channels of labor be opened up for the poorer class; if a more perfect and diversified culture of the land, and an application of irrigating streams for improving waste lands, retain in their villages these numerous labourers, now congregated in populous towns, through want, neglect, and many other causes; if more extensive meadows and superior pasturage conduce to the improvement in the breed of cattle and horses; and if the food of the people become more wholesome and abundant?'

"*M. Hericart de Thury.*—'The law of Angeville is but the first instalment of a more complete legislation on this high and important question of irrigation. There is not perhaps, in other districts, a sufficient knowledge of all the advantage that can be rendered by irrigation and the influential part it may perform in the destinies of the people.'

"*M. Auguste de Gasparin.*—'At Orange, the fifth part of the land is submitted to irrigation. Meadows as beautiful as those of Milan are mowed three or four times a year, and are let as high as 450 francs the hectare One-third of this sum is expended in the management of the land. These returns equal from three to ten times the revenue of identically similar soils under ordinary cultivation. At Avignon, the water triples the value of the excellent land which surrounds the town. At Vaison, and at Malancene, irrigation raises the value of the naturally inferior soils to 12,000 and 14,000 francs the hectare. At Cavaillon, the waters of the Durance have, in some places, increased the value of the soil tenfold. Lands, which hardly fetched 500 francs the hectare, are valued at 5000. At Sorgues, a sterile country, which was repulsive to the eye of the traveller, has improved a hundred-told through irrigation. The desert has been here changed, as it were, into the smiling plains of Lombardy.

"M. Taluyers, of Saint Laurent, (Rhêne,) has, with an outlay of only 20,000 francs, formed a meadow of 33 hectares, producing an income of 10,000 francs. The land brought in previously no more than 1200 francs. It is, moreover, with very small outlay that the riches of the soil have been thus opened up. At Cavaillon, close to the banks of the Durance, occurs almost the only instance in which the system has acquired a remarkable development. Everywhere else the operations have been mere experiments. An example is hereby, however, bequeathed to posterity, demonstrative of the course they ought to adopt, as well as of its practicability.'

"*M. Nadault de Buffon.*—'France alone requires the formation of at least 5,000,000 hectares of meadow land, to give it the proportion of one to two with land cultivated by the plough. An increase of riches would then ensue to the amount of more than 6000 millions, (£240,000,000,) equivalent to a revenue of more than 300 millions, (£12,000,000.) Thus, notwithstanding the expense incurred, irrigation is one of the most certain elements of wealth to the countries which employ it: a fact easily confirmed by the more outward aspect of general comfort among the population in irrigated countries, by the cleanliness and convenience of the rural habitations, and by the facility with which the various liabilities are discharged.'

"*M. de Maunay de Mornay*, in his 'Studies on the Irrigation of Upper Italy,' has given a description of the magnificent works executed in that country, with information as to the manner of their construction, and the changes requisite in French legislation necessary to get rid of the obstacles, now frequently invincible, which are opposed to the use of running waters. 'In the present state of things,' says M. de Mornay, 'the streams pursue their course to the sea without affording one-twentieth part of the advantages which might be secured from them.'

"It would be superfluous to enlarge here on the considerations of public interest which are now more strongly than ever connected with the subject of agricultural labor. Those who are anxious for the future prosperity of the country are bound to second the government in realizing the idea expressed by the Minister of Agriculture and Commerce, in his circular of the

3d March, 1850:—'The government wishes the lot of the agricultural laborers to be so enviable as to counteract the temptation to exchange it for a town-life. On the other hand, it is desirable that the artisan in town be induced to remove to the midst of the fields, where he will find health and prosperity for himself and his family.'

"All these motives amply prove that the moment has arrived for carrying into execution the long-meditated project of forming a company which shall raise the funds necessary for those great works of irrigation which do honor to some neighboring countries, and of which France has been hitherto deprived. It is with this object that the company whose title, constitution, powers, and regulations are given below, has just been definitively constituted. The company is entitled, 'The General Agricultural, Irrigation, and Drainage Company, with or without the use of Liquid Manure.'"

December 1st, 1850.

House of Representatives, Washington, December 13th, 1850.

Sir:—I have the honor to reply to your interrogatories of the 12th inst. on the subject of sheep husbandry in the South.

1st. In my congressional district, we have the Southdown, Bakewell, Merino, and other *blooded* sheep; but by far the greater quantity are mixed-blooded; and these last are the more healthy, and are consequently the favourite sheep.

2d. The clip of wool varies, of course, according to the quality of the sheep. Two pounds per head for the ordinary stock of the country is about an average. Flocks of the improved breed yield much better.

3d. They are remarkably healthy and very prolific in young, more so, perhaps, than in any country where they are so little cared for by their owners.

4th. *Sheep-rot* is the only disease to which they are very subject, and does not happen so often as in other countries.

5th. I do not think it an object with our planters to increase their flocks to a greater extent than to supply their family wants. The sheep is valued with us more for his flesh than his fleece. The mutton, we think, is quite equal to any *in the world*.

6th. We market our wool as we do our cotton, and ordinarily sell it to the same persons and in the same way. A good deal is worked up into cloth in the country.

7th. The cost of raising and keeping sheep is so near nothing, that I have never heard it computed. Our farmers sometimes have waste grounds, on which they pasture their sheep; but generally they run in the open woods; and here, I think, they do best. They have a little salt thrown them once a week, and besides this no attention is ordinarily given them.

8th. We do not ordinarily feed them at all. They generally subsist themselves in the woods or in the fields.

9th. We have no grasses or other esculents for the feed of sheep in summer. The ordinary grasses of the country, such as are indigenous to the soil, we find quite sufficient.

10th. We have neither grain nor dry food for them in the winter. If we have occasion to feed them, which seldom happens, we give them the

blades of the Indian corn, which we call "fodder." Sometimes a little corn is given them, but I doubt if it does not more harm than good.

Our winters are mild, and it seldom happens that a sheep is not able to subsist himself without aid. If we find him lingering in January or February, we give him some assistance; but he gets along very well on the old grass until late in the winter; and by the 1st of March he can nip the new crop.

On the whole, I know of no country where the sheep prospers more than in South Mississippi. The fleece may not be so fine or so heavy as in more northern latitudes; but he yields it free of cost, and throws his flesh into the bargain. The flocks multiply with singular rapidity, and, as I have said before, the mutton is equal to any in the world.

Very truly, your obedient servant,

A. G. BROWN.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Lisbon Post Office, Union County, Arkansas, January 6th, 1851.

Sir:—The Patent Office Circular of 1850 having been placed in my hands by Colonel John R. Hampton, to whom it was sent for reply, I submit, after due reflection, the following observations, which are designed to have reference more especially to the southern upland counties of this state.

Wheat.—This crop is not generally cultivated in this region, the soil and climate not being well adapted to it. However, of a favourable season, the yield is, say 15 bushels per acre, and of very superior quality, weighing from 65 lbs. to 70 lbs. per bushel.

Corn is planted generally for home consumption, and as yet there has been seldom more made than the wants of the country called for, owing to its recent settlement and constant and rapidly increasing population. Kind most successful, large white. Average product, say 20 bushels per acre.

Oats, so far as tried, do well here. The large white, or Egyptian, for fall, and the little black for spring sowing. Our lands are, as yet, too fresh to enable us to judge with any degree of accuracy as to what extent this crop is an exhauster. This crop is much more generally cultivated than wheat, our light sandy lands being better adapted to it.

Sweet potatoes are largely cultivated and constitute our most valuable root crop. Product per acre, 200 to 400 bushels. Kind most cultivated, yellow yams.

Irish potatoes succeed well, and are generally planted for spring and early summer use. Time of planting, middle of January to middle of February for early crop. Average per acre, 30 to 40 bushels.

Cotton.—This is our staple crop; time of planting, middle of March to the middle of April—though fair crops are occasionally made, with a favorable season, planted as late as the middle of May; average product per acre, with fair cultivation, 200 pounds ginned cotton. We value cotton-seed very highly as a fertilizer either for corn or cotton; and, as a general thing, but little attention is given to any other kind of manure. A few of our planters, however, are now turning their attention to that subject, as well

as hill-side ditching and horizontal cultivation, which I feel assured will result in a great benefit both to themselves and the community.

With sentiments of the highest regard and respect,

I am very sincerely yours,

E. W. WRIGHT.

THOMAS EWBANK, Esq.
Commissioner of Patents.

Sir:—Through the kindness of Thos. C. Fletcher, Esq., of this place, I have been favored with a copy of your agricultural circular, and requested to reply to its inquiries so far as the productions of Jefferson county extend.

Wheat.—The varieties mostly cultivated are the red-chaff, bald, and May wheat; average product per acre, 8 bushels; time of seeding is from the 15th of September to the 15th of November; and the time of harvesting from the 20th of May to the last of June. It is usually sown without previous preparation of seed: one bushel per acre is the quantity usually sown. It is usually sown among corn or on oat stubble, and ploughed under. The yield per acre is not increasing. There is no system of crops practised; the ground is usually cultivated in corn till it will not produce a full crop, and then sown with wheat or oats "to rest it." Wheat was worth from 75 cents to $1.20 in St. Louis, in 1850.

Corn.—Common white and yellow are varieties sown; the average yield per acre is 30 bushels; the cost of production, about 15 cents per bushel. The manner of cultivation is to break up the ground in the spring; check off about 4 feet apart each way, having from 2 to 4 stalks in a hill; plough 3 or 4 times with shovel or Carey-plough, and by this time the weather is generally very warm. "Get up on the fence and lay it by." It is usually fed whole. Manure is not much used.

Oats.—We sow 2 bushels per acre, giving a yield of about 20 bushels per acre. In the opinion of your correspondent, oats are the most exhausting crop grown on our farms, (weeds excepted.)

Barley, *rye*, *peas*, and *beans* are not cultivated.

There are but few good meadows, notwithstanding much of our soil is well adapted to the growth of grass. The yield per acre is about one ton without manure.

Butter is worth 10 cents per pound. We have no pastures for our cattle. They live in the "range" in summer, and in the stalk-fields in winter. A good cow is worth from $10 to $12. We have no imported cattle; never stall feed, but allow our beef to fatten in the range. Flocks of sheep usually diminish in numbers on account of the depredations of wolves.

Wool-growing would be profitable with proper attention.

Our best *hogs* are a mixture of the Berkshire and the common breeds. They run at large; and get just corn enough to keep them alive until it is time to fatten them, when they are turned into a lot and fed on corn in the ear from 2 to 6 weeks.

Potatoes and *turnips* are grown only in small quantities for family use.

Fruit.—There are a few good orchards in the county. Fruit, especially apples, is one of the most profitable crops we raise. The large yield 50 bushels per acre; expense, from 20 to 30 cents per bushel, which sells from 62½ to 70 cents.

John Shoener raised, in the neighborhood of Orwigsburg, 270 bushels on 3 acres of land, of the red-gourd corn. On ordinary land, his mode of planting is by dropping a single grain in the drill 12 or 15 inches apart; distance between the drills 3 feet.

Rye and *oats* are raised here, of which rye is the least exhausting and the most profitable crop.

Buckwheat is an excellent and profitable article, if it succeeds; but it is a very precarious crop. It is used extensively in this county for fattening hogs and cattle. Lime, as a top-dressing, is an excellent manure for this grain. Land that will produce no other crop will bring buckwheat. Clover seed may be sown with buckwheat, and a good crop expected, if the land is previously limed.

A large crop of the common turnip and potato is raised in this county; and they generally find a good market. There is no particular mode practised in raising these crops. This county depends upon the north and northwestern parts of Pennsylvania for its supply of beef and mutton. The farmer has so good a market for his grain and hay, that he finds the raising of cattle a poor business. The great facility of procuring ready-burned lime from Berks County, via of Schuylkill canal, enables us to improve our lands rapidly and with reasonable expense. Lime is delivered on the canal at 9 cents per bushel; and 50 bushels to an acre are considered sufficient to produce a good crop of hay. Let the general government protect our coal trade, and enable our miners to pay us for our produce, is all the farmers of Schuylkill county ask. They want no foreign market. If we are to depend upon that, we shall soon be obliged to stop raising crops; but if the coal business flourishes, then we have an excellent market for all we can raise.

Respectfully yours,

JAC. HAMMER.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Statesville, Aredell County, N. C., December 28th, 1850.

Sir:—Your circular, soliciting information on the various branches of agriculture, was placed in my hands. I feel extreme reluctance in undertaking to answer any part of it. We have no systematic farming, except what may be done by a few isolated individuals; nor have we any agricultural society here. You will therefore perceive how difficult it is to collect information nearly approximating to the truth, of the kind you desire, as well as how important such returns must be. I have concluded, however, to answer, as well as I am able, with the means at my command, a few of the questions presented in your circular; and you can make what disposition of this you think proper.

Wheat.—We have the spring wheat, the red bearded, fly-proof, blue-straw, May, and Mediterranean: a number of other varieties have been tried within the last few years, and discarded. The two first named proved the best last season; and, in consequence, more than usual of both kinds have been seeded down this fall. Seeding of all the varieties, except May, usually in October. Early seeding would be greatly preferable, if it were not from danger of the fly, which is certain to attack the young wheat,

in case of drought immediately succeeding sowing. The May wheat, to avoid the spring frost, to which we are subject, cannot be safely sown until November or December. The latter kind is harvested about the last of May, or first of June; the other varieties, from the 15th to 25th of June. One bushel of seed is sown per acre; and usually dispatched, whether on stalk or fallow land, with one ploughing. Wheat, owing to the Hessian-fly, late frost, and, I may add, to our indifferent farming, is here an uncertain crop. No remedy is known here for the Hessian-fly. Threshing as soon as the wheat is dry is an effectual remedy for the weevil.

Corn.—The white is most esteemed for bread, and on account of its deep and extended roots; in other words, standing a drought better than the yellow. The yellow, on account of its being a softer variety, is preferred for stock, and is supposed to yield better than the white on bottom land. The average yield, I think, must be about 15, or farthest, 20 bushels per acre. A bushel of corn cannot be grown here with profit, for less than 40 cents. Farmers seldom get that much for it; more frequently, 20 and 25 cents per bushel.

Oats are extensively grown in this county; 15 bushels is about the average yield per acre; 1 or 2 bushels, according to the land, sown per acre.

Peas are beginning to be extensively cultivated here; not, however, as a renovator of the soil; though, from experiments I have seen made, I have no doubt of their being a very renovating crop, and the most economical fertilizer of the soil of any crop we can grow upon it; for the beneficial effects of this are observed, whether turned under ground or left to decay on the surface. The pea is mostly planted here for hogs, and they easily repay for the labor bestowed upon their cultivation for that purpose. From experiments made in this county with clover, I am inclined to think it will not do to rely upon it as a renovator of the soil, as it requires a rich soil to produce it; yet, it is an excellent renovator, but liable to be cut short by early drought. Abundance of hay is made in this county on our swamps or wet bottoms, though not so much as formerly, as vast quantities of our swamps have been redeemed within the last few years, and converted into clover land. No attention is paid in this county to the growing of wool, except for domestic purposes; neither would it be worth while, on account of the dogs. The extermination of the whole canine race, I have no doubt, would result to the advantage of the people of this county; as there can be no doubt of the susceptibility of our soil and climate for the purposes of wool-growing. Our whole system of farming is gradually tending towards a change for the better. Increased attention is being paid to the subject of making manure; though we labor under great disadvantages in this respect. We have neither lime nor plaster in this county, but abundance of every other material, which, as experiments have proved, and are proving, can, with little cost, be converted into excellent manure; and even the small deposit of those matured upon the soil and turned regularly. When the plants are of a sufficient size, they should be thinned, so as to be 10 or 12 inches apart; and, by chopping over twice, and ploughing once, you may expect an abundant crop. I consider turnips are more profitable for a farmer than any other crop he could plant or sow on the same piece of ground. The kind of seed most sown or preferred in this section is the English white, which grows mostly out of the ground, and, for this reason,

the turnips need hilling up before much cold weather comes on them. I cannot do the subject justice—so I will close.

Very respectfully, yours,

R. H. BENNET.

T. EWBANK.

Vermilion, Erie County, Ohio, December 10th, 1850.

Sir:—Your Agricultural Circular came to me in due season, and, although I cannot flatter myself with being able materially to add to the value of your report, still, as this report from the Patent Office is becoming more and more the means of extensive good to our wide-extended country, I cannot refuse my feeble efforts to increase its usefulness. My field of observation is confined chiefly to the eastern parts of Erie and Huron, and the west part of Lorain counties. This territory is on the extreme southern bend of Lake Erie, and comprises almost every variety of soil, and so intermingled that it is difficult finding 100 acres which do not embrace several varieties. The western parts of the above-named counties are upon the limestone formation; the eastern parts, and Lorain, on sandstone and clay. The drift forming the *superstrata* appears to have come from the west and northwest, so that considerable quantities of lime are intermingled with the soil of the eastern parts of the field of my observations. The climate is somewhat severe and open in winter, very little snow falling, which often winter-kills wheat, especially on clayey and wet soils. The spring is always cold, chilly, and backward, for this latitude, owing to the large quantities of ice and cold water in the lake. Summer is warm and pleasant, and the autumn very serene, mild, and pleasant, owing to the proximity of a large, shallow body of water, by the powerful rays of the summer sun. Hence we feel almost sure of sound corn, if planted by the 10th of June. It is a good fruit country, for the chills of spring keep back the buds, and, although disagreeable to the senses, are still above the freezing point, and prevent injury from late frosts. Apples scarcely ever fail; and peaches, along the lake, and 3 or 4 miles back, only fail once in 3 or 4 years.

These preliminary observations on our geographical and geological situations and meteorological peculiarities will enable the intelligent reader to comprehend the advantages and disadvantages of our location.

Wheat is our most important crop. In its cultivation, we often run on Charybdis in attempting to avoid Scylla; that is, by sowing late to avoid the fly, (for the Hessian-fly seldom injures wheat sown after the 24th of September,) we expose the too tender plants to the severe frosts and frequent thaws of winter, thus losing by winter-killing; or else the rust is liable to take it just before it ripens, on all but the warmest soils. The most successful way to avoid all these evils is to keep the land in high tilth; sow late, to avoid the fly; plough deep; and thoroughly drain, either by ditching or by throwing into narrow beds, to prevent heaving, and drowning out; and cultivate the earliest varieties, to avoid the rust. The Soules, bluestem, white, improved flint, and Hutchinson are all in good repute for this purpose: and those who practise the above seeds seldom fail of a good crop of wheat. There is no regular system of rotation which has obtained among us. Such is the diversity of soils, and so much do our farmers accommodate their operations to what they call their convenience or necessities,

that few practise alike, or pursue any fixed plan. Fronting on the lake is a soil remarkably adapted to wheat culture. Here a system (if it may be called a system) of stubbling prevails—wheat succeeding wheat for a series of years, and without any material diminution of the yield. This year, 30 or 40 bushels per acre have been produced from lands from 3 to 6 years in wheat, without rest or any intervening crop—merely burning off or turning under the stubble. Generally, back from the lake, naked summer-fallows secure the best crops. Deep ploughing is found beneficial, as the subsoil is generally composed of all the materials for promoting the growth of vegetation, and only needs exposing to the action of the elements to fit it for that purpose.

Two ploughings are given in summer-fallowing, and generally one for stubbling, or when wheat succeeds corn or oats. From the 20th to the last of September is the best time to seed, though, the Hessian-fly out of the way, the first part of September would be much better. One and a half bushel per acre is about the average amount of seed used. This was a heavy-timbered country; and, as the stumps get out of the way, we can plough deeper and cleaner, and in every way manage it better than formerly. So that the crop is increased by the greater quantity in cultivation, and the larger yield per acre. I am satisfied the average yield is not far from 13 bushels per acre, for a series of years previous to this year, while, this year, the average is not less than 25 bushels—probably over. Taking all the wheat raised for 5 years, I estimate the average cost of production at 67 cents; and the average price during that time has been about 85 cents—this year, 75 cents.

Corn.—We cultivate several varieties of what is here called gourd-seed. They are all nearly a hybrid between the rough gourd-seed of the South and the flints of the North. Experiments have proved that the gourd-seed of the South, in a few years, accommodates itself to our climate, by becoming more flinty; while the flint corn of New England approximates towards the gourd by becoming dented, and increasing in size of ears and number of rows. Fifty bushels per acre are about the average product, and the cost of production not far from 25 cents per bushel. The best crops are raised with least labor (and those two words, *best* and *least*, are much in favor) by manuring from the stock-yard a clover sod, or an old meadow, thoroughly breaking it up just before planting; and, having rolled or bushed it, drag with a sharp harrow till it is mellow, then plant, and use a corn-cultivator and plough, particularly in keeping down the weeds. The best time for planting is the last of May, except on dry, sandy soils.

Clover and Grasses.—In good seasons, 2 tons per acre are the average. This year it was less, by half. The average for a series of years is about 1½ ton. Timothy and red-top for permanent meadows, and clover and timothy on arable lands, are preferred. From 4 to 8 quarts of seed per acre are usually sown; and in seeding marshy and wet lands, which produce weeds very abundantly, from one-half to one bushel of seed, sown in September, has proved very successful. The cost of production is about $3 per ton, and it is generally worth from $4 to $5.

Sheep and Wool.—We consider wool-growing profitable, when common or medium quality brings 25 cents per pound. I compute the cost as follows:

Dr.		
To 100 sheep	$100.00	
" 30 acres, $15 per acre	450.00	
	$550.00	capital.
Interest for 1 year	$33.00	
Saving 5 tons of hay	10.00	
Salt, attention, shearing, &c.	50.00	
	$93.00	outlay.

Cr.		
By 96 fleeces, (deducting 4 for casualties,) each of 3½ lbs. in weight, at 25 cents per pound, would equal	$84.00	
By 60 lambs, more than keeping old stock good	30.00	
	$114.00	income.
	93.00	outlay.
	$21.00	profit.

This estimate is made upon good common sheep. The advocates for the coarse-woolled, and their opponents, for the fine, *figure much larger profits.* I doubt whether there is much difference in the amount of food necessary to produce a pound of either quality, or whether there is much difference in the profits. The superior bodies, for market, of the coarse-woolled, their hardiness, and superior nursing qualities, fully, if not more than balancing the higher priced fleeces of the fine-woolled. We need both kinds; and it is presumable that those who will give the *necessary attention* to raising a fine-woolled flock, will find it equally as profitable as those will who prefer to devote less attention to a coarser one. Our lands are rather wet, and the grass rank, which seems to indicate them as better suited to the coarser woolled sheep. Some few amateur breeders will, of course, command the market, and make much ado about the *enormous* profits and wonderful fleeces of their respective flocks; but, in general, we must content ourselves with ordinary fleeces, common prices, and moderate profits—not, however, neglecting any opportunity for improvement.

Hogs.—We consider the Berkshire, and crosses between that and the grass, the best breeds. The southern part of this State, Kentucky, Indiana, and Illinois can raise corn and, consequently, pork, so much cheaper than we can, that they have nearly driven us out of the market; and especially since corn has brought an advanced price at our lake markets, in consequence of its increased exportation to Europe. *Our* corn is worth more than the pork it will make. Very little is made for export. The cheapest way we can make pork is to fatten mostly on apples. They will increase in weight nearly or quite as fast on good ripe apples as they will on corn, and the pork is nearly as good, if fed on corn a few weeks before killing. A little grain should be given with the apples. Meal is much better than dry corn, and, if cooked, all the better; but grinding and cooking is very little practised.

Fruit Culture.—There is increased attention to the cultivation of good

fruit. I have no doubt but land put out to apple-trees, providing suitable pains is taken in selecting the best varieties, is as profitable to the farmer as almost any other crop. I am satisfied, from feeding them to various kinds of stock, that good sweet apples are worth nearly as much as potatoes. I tried them on a colt we were weaning this fall, and which had fallen away considerably, and he improved faster than I ever had one on oats. Probably, cooked potatoes are more nutritious than apples, but, taking the trouble and expense of cooking into account, we hardly doubt that apples are worth within from 50 to 75 per cent. as much as potatoes, for all kinds of stock.

Peaches, too, may be made profitable, to the extent of the demand, green and dried. Peaches, peeled and dried, bring from $3 to $3½ per bushel; unpealed, half price. It is said, by those pretending to know, that our climate and soil will not produce as fine peaches as New Jersey. I can see no good reason for this opinion, except that there has not been pains taken to cultivate them here. We have a better soil, and as good warm weather in summer and fall as they, and as much of it. What, then, is there to hinder? I have a small pioneer orchard growing, and just wish to notify our New Jersey friends that, if they can send peaches to our lake *now*, to look out for competition from this quarter, even as far as New York and Boston, before this generation has passed away.

Grapes.—I would suggest that those who wish to have a supply of delicious grapes for the table, fair and bright, will be much more likely to have their desires gratified by letting their vines climb some good-sized tree, instead of keeping them confined to a stake, near the ground. My Isabellas never fail of being fair and bright, and ripen a week or two earlier up in a tree-top; while, near the ground, on the arbor and trellis, they mildew and rot, nearly half the time. Very good wine is made here from the Isabella, by boiling the unfermented juice—about three barrels to one.

The year 1850 has been very remarkable on several accounts. By referring to my diary, I find January was cold up to the 7th, then warm, with some rain.

BENJAMIN SOMMERS.

Centreville, Wayne County, Indiana, December 24th, 1850.

Sir:—In answer to the interrogatories contained in your Agricultural Circular, a copy of which I have received, I will endeavour to give the information required, so far as my limited means will permit. As the nature and quality of the soil is connected with agriculture, I will merely state that a tenacious clay soil prevails in our county, with a subsoil of the same, except our creek bottoms, which are a black loam. A large proportion of the timber is beech and sugar-maple, with hickory, oak, ash, poplar, walnut, and cherry. In agriculture, we are in what might be termed a transition state: done making farms, and beginning to farm. Much interest is manifested by some in receiving and imparting knowledge on the subject and in procuring improved implements of husbandry. The result of this wholesome condition in the farming community was the organization of the Wayne County Agricultural Society.

Wheat.—The white and red-chaff bearded are the kinds generally cultivated. The velvet and Mediterranean are sown, but not extensively. The velvet is much esteemed, and more of it will be sown than formerly. The

Mediterranean yields more per acre and is the least liable to casualties; but it has a soft straw, which renders it liable to lodge. Probable average yield per acre, 19 bushels. Time of seeding, from the last of August to the 10th of October: from the 5th to the 15th September is preferred. Harvesting, the last week of June and first week of July. Quantity sown per acre, 1¼ to 1½ bushel, the latter quantity to be preferred on strong land. One ploughing, from 4 to 5 inches deep, is all the land usually gets. By means of a better method of farming, and our lands having been longer in cultivation, the quantity of straw is diminished and that of grain increased, while the number of acres sown has increased threefold in consequence of the improvements in roads and the building of mills, which afford a ready cash market. We have no established system of rotation in crops, but are governed by circumstances or the nature of the soil. The practice of sowing wheat on the same field one, two, and three years in succession is finding favour with some. Many sow after corn; but we do not get so good a crop as on fallow ground or stubble. The difficulties that the wheat-grower here has to contend with are the Hessian-fly, freezing out, and rust. Manure is considered a good remedy against all of them. Sowing on sward is the best preventive against freezing out. Average price for 1850, 60 cents per bushel.

Corn.—This great staple of the farmer is a crop of the first importance with us, and, whatever mishaps befall other crops, this always comes forward and takes us through. It is planted from the 24th of April to the 1st of June: From the 1st to the 10th of May is best, 4 quarts of seed to the acre. We have a white gourd-seed corn, with a red cob, much esteemed, and a large white variety that yields well; also the yellow gourd-seed, much in favour with some for feeding stock. Probable average product per acre, 40 bushels. It is difficult to make an accurate estimate of the cost per bushel for raising corn, for the difference in the quality of the soil would make a difference of 10 per cent. in raising. The following is an estimate for a medium quality of land:—For ploughing, 75 cents per acre; harrowing, 35 cents; marking, planting, and seed, 60 cents; one harrowing and three plantings, $1.50; interest for the land, $1.20; total cost for one acre, $4.40, or 11 cents per bushel. The great art of raising corn consists in keeping the ground free from weeds, and well pulverized about the roots while it is young, and stirring the soil deep.

Clover and Grasses.—Our meadows will average one ton per acre. Timothy is best, though, on land somewhat worn, equal parts of clover and timothy are sown, say from 4 to 6 quarts to the acre. Cost of growing hay, $2.60 per ton.

Dairy husbandry is not followed here as a business. Our surplus butter is sold in our towns at an average of 10 cents per pound.

Neat Cattle.—Some attempts have been made to introduce the Durhams among us, and, judging from the results produced by crossing them with our native stock, I feel assured that great good would result from having a full-blooded Durham bull in every neighbourhood. As regards the cost of rearing until 3 years old, the best answer I can give is, that it is not worth the price they would sell for at that age, which is from $16 to $18 per head. Pasturage is worth 50 cents per month, and wintering on corn fodder and straw, about the same. Good cows sell from $14 to $16 each the year round.

Sheep and Wool.—In a country like ours, where the land is nearly all

adapted to agricultural purposes, the growing of wool cannot be profitable at present prices. The number of lambs annually raised is about two-thirds that of the ewes. Sheep do well here; and, if farmers would so arrange it as to have the lambs come in spring, there would be very few lost.

Hogs.—What the best breeds? This question reminds me of the farmer who was noted for his good-looking porkers, and, on being asked of what breed they were, answered by pointing to his corn-crib. Notwithstanding the old farmer's opinion of the potency of a large and well-filled corn-crib in making a good breed of hogs, there are some varieties that show fuller and more palpable evidence of the benefits of said crib than others. The Irish graziers are most esteemed here. While corn is so cheap and so easily raised as at present, feeding it to hogs in the ear is thought to be the best plan; but I have no doubt that cooking potatoes, pumpkins, and apples together, and adding corn meal, is a method worthy the attention of farmers. Root crops are only raised for family use.

Fruit culture is receiving increased attention, but it is not much used as food for stock.

Potatoes are considered preferable for that purpose. Orchards have suffered far more from the "fire-blight" during the past than in any previous year, which has been attributed to an exceedingly dry season. Those on dry localities have suffered most. All attempts to raise peach-trees have proved unavailing for the last eight or ten years, in consequence of the "yellows."

Manure.—When it accumulates about our barns and stables, so as to be in the way, we generally remove the nuisance to our fields, instead of pulling down our buildings. I am under obligations to you for a package of lucerne, or French clover seed. It came up, and grew well, but after it had attained 4 to 6 inches in height, it was mostly destroyed by an insect at the root. The Germans say it will grow there. Oats not sown as much as formerly; it is thought to be an exhausting crop. Average yield per acre, 25 bushels. Barley not much raised; is not so hard on the soil as oats; average per acre, 20 bushels. Rye, hardly any sown. Peas and beans raised only for family use.

Yours respectfully,

A. HOOVER.

Bethmont P. O., Orange Co., N. C., December 21st, 1850.

Sir:—I have this day received your Agricultural Circular, and proceed to answer, as well as I can, such of your questions as apply to this vicinity.

Wheat.—Varieties in use, golden chaff, Black Sea, white bearded, Mediterranean, occasionally red and early purple straw, and Pennsylvania blue-stem. Time of seeding, May, October, November, and December. October is best. Harvest about the 20th June. No preparation of seed generally, except to clear it from cockle and cheat. It is generally sown on corn land, and put in in a slovenly manner. Some do better, sowing on fallow ground broken up late in summer, or early in autumn, and ploughed or harrowed in. I think the yield per acre has been diminishing for many years, and hope, after falling to an average of 5 bushels per acre, it has reached its minimum, and is beginning to rise, by a gradually improved system of farming. A few of us have bought up old exhausted broom-straw fields

to yield 8 to 10 bushels per acre. The rotation has too generally been corn, wheat, pasturing after harvest, for 8 or 10 years, till the ground refuses to bring wheat. Then, corn and oats alternately, till the poor returns compel the unthrifty farmer to turn out his fields to broom-straw, and clear more land to be destroyed by a similar process, or move to the West. The average price of wheat may be set down at 80 cents. I have introduced the early purple-straw, a red wheat, ripening June 10th, therefore not subject to rust, which is the greatest enemy to wheat in this section, but not attacking earlier than the 10th of June. I secure it from smut, the great enemy to early wheat, by soaking it in a solution of salt, from 12 to 48 hours, and drying in lime or ashes, so as to scatter. This I have found a perfect protection. I sold my crop this year for seed, at $1.25 per bushel. I have sowed this fall samples of Troy, Iturean, white Genesee, and Zimmerman's, besides the early purple-straw, and hope to report another year.

Corn.—Common gourd-seed and Collins's corn: I think the average per acre is 15 to 20 bushels. Some do much better. Others worse. Mostly cultivated with the plough—little hoeing done. Oats generally sown on the worst land, having been planted with corn the previous year: regarded an exhausting crop. Seed per acre, 4 to 5 pecks. Product in good ground, 30 to 40 bushels; common average, about 10 bushels. Barley and rye not cultivated. Beans and peas not much cultivated, except for the table. Clover found valuable by the few who have adopted it. Timothy mostly sown in meadows, though most meadows are not sown at all, but grow up to the coarse native grasses. I am experimenting with orchard grass, lucerne, Guinea grass, perennial rye grass, and herds grass, and may, hereafter, be able to report useful results. Neat cattle receive little attention here, cost little, and are worth little. What are called dairy-cows sell at from $10 to $14 each. A few Durhams were introduced a few years since, without profit. The Devons will probably succeed well. Sheep very little attended to, and sadly annoyed and destroyed by dogs.

Hogs.—The Berkshire, or rather half Berkshire, seems to be the favorite. A cross of the Berkshire with the long-sided Kentucky sow has proved a valuable hog. Tobacco, very little cultivated. Potatoes, Irish and sweet, cultivated for domestic use only.

Indications of the Thermometer, observed at sunrise only.

Average for JANUARY, 1850..... 39°34′
Coldest day, Tuesday, 1st..... 18
Warmest, Saturday, 26th..... 64
(Much rain, little or no snow.)

FEBRUARY, average..... 35.34
Coldest day, Tuesday, 5th..... 14
Warmest, Saturday, 9th..... 54
12 days as low as 32°, a little snow once.
11 days of rain.

MARCH, average..... 42.36
Coldest day, Friday, 29th..... 27
Warmest, 1st..... 62.30
Falling weather, 15 days; snow, 27th and 28th.

APRIL, average..... 50.14
Coldest day, Thursday, 18th..... 32
Warmest, Tuesday, 23d..... 66
Rain 12 days.

MAY, average..... 59⅛
Coldest day, Sunday, 12th..... 42
Warmest, 5th..... 70
One good rain, and several light showers.

JUNE, average..... 66½
Coldest day, Monday, 12th..... 49
Warmest, Thursday, 27th..... 74
Very little rain this month.

JULY, average..... 71½
Coldest day, Friday 12th..... 67
Warmest, 31st..... 76¼
Temperature uniform, much cloudy or foggy weather, little or no rain.

AUGUST, average..... 71½
Coldest day, Wednesday, 28th..... 63
Warmest, Thursday, 1st..... 76¼
Uniformly warm, 5 slight showers, and 1 good rain, Wednesday, 14th.

SEPTEMBER, average	65°
Coldest days, 18th and 30th	52
Warmest, 2d	74
First half cloudy; last half clear; rather dry on the whole.	
OCTOBER, average	49½
Coldest day, 21st	36
Warmest, 18th	67
Slight frost 7th and 8th, ther.	42
One rain, the 26th.	
NOVEMBER, average	48½
Coldest day, 18th	26
Warmest, 28th and 29th	67
Rather a dry month.	
DECEMBER, average to the 23d	42¾
Coldest day, 14th	20
Warmest, 4th	64
A dry month.	
From JANUARY to MAY, unusually wet.	
From MAY to DEC. unusually dry.	

I send the above hasty sketch, and hope to do better another time.

Very respectfully,

W. J. BINGHAM.

P. S.—The wheat crop much injured by rust, and in some cases ruined. Oat and corn crops cut short by drought.

W. J. B.

Litchfield, Connecticut, December, 1850.

Sir:—Having seen the notice of a circular from you, requesting information on various subjects relating to agriculture, I give such information as I have been able to collect.

Wheat.—Very little, if any, raised in this State; none in this part of it.

Corn.—Yellow eight-rowed most common; some other varieties cultivated; 40 to 45 bushels per acre a fair yield; sometimes 60 bushels, and even 100 bushels have been raised; cost of production not generally estimated; system of culture, the plough, cultivator, and hoe in general use. It is generally fed raw, and often without grinding.

Barley.—Very little raised in this part of the State.

Beans.—Not extensively cultivated. *Peas*, ditto.

Rye.—Average yield per acre, 20 to 25 bushels; quantity of seed sown, 1½ bushel per acre, and often much benefited by harrowing in the spring, when the ground is sufficiently dry.

Clover and Grasses.—Average quantity of hay per acre about 1 ton. Fertilizers, barn-yard manure, ashes, gypsum. Clover and timothy generally preferred for seeding down.

Dairy Husbandry.—I have had no opportunity to ascertain, except the prices of articles. Butter, in summer, 12½ to 14 cents; in winter, 18 to 20 cents per pound; cheese, 6 to 8 cents per pound.

Neat Cattle.—Cost of good cows, $25 to $45 each; working oxen sell from $80 to $100 per pair.

Cotton, *sugar-cane*, *rice*, and *tobacco* not cultivated.

Potatoes.—Irish formerly much raised: product 300 to 400 bushels per acre; this year nearly all rotted—a few favored pieces on sandy loam without manure, were the only exceptions. "Waterbury reds" the best—yield generally good—this year, hardly 100 bushels per acre.

Turnips are on the increase since the failure of potatoes; price per bushel, 15 to 20 cents.

Beets, Carrots, &c.—Few raised except for table use. Hemp not cultivated here. No extra attention is paid to fruit culture in this part of the

State. The subject of manures has scarcely begun to excite attention here; very little used except barn-yard and ashes.

I have thus given you a brief and very imperfect sketch of agricultural matters in this part of our State. Should the same be desired another year, I may, perhaps, be able to send you something more valuable.

Meteorological Table for 1850.

Months.	Mean.	Highest.	Day of month.	Lowest.	Day of month.	Range.	Remarks.
	° ′	°		°		°	
January	28.20	52	25	8	30	44	Wild month—sleighing good.
February	26.08	50	26	5	6	55	" " road dusty.
March	29.25	59	14	7	4	52	Great storm, night of Feb. 28th.
April	37.51	70	28	18	18	52	Cold, unpleasant month.
May	47.79	76	28	29	2	47	" " wet "
June	63.83	90	20	41	1	49	Warm, growing month.
July	69.	90	30	50	12 27	40	" " "
August	64.48	88	13	40	19	48	Distinguished for great rains.
September	57.71	80	6	31	30	49	Mild, pleasant month.
October	48.45	73	17	22	30	51	" " Indian summer.
November.....	39.87	63	4	19	23 4	44	" " month.
December	23.88	47	1	2	24	49	Mean of year, 44° 68′; range, 95°.

I am sorry to feel obliged to say that the agricultural resources of this part of the State are but feebly developed, owing to the stereotyped notions of the people, and there is but little prospect of immediate improvement. The agricultural society, however, is doing something, and may in time make an important change.

Respectfully yours,

J. L. HENDRICK.

Hoodlands, Perrysville P. O., Cecil County, Maryland, December 25th, 1850.

Sir:—In reply to your circular, I would say that the varieties of wheat most esteemed by me, and in use in our neighborhood, lying on the navigable waters of the Susquehanna and Principio Creek, are the white and red blue-stem; the time of sowing with us ranges from the 15th of September to the 10th of October, and our harvest usually commences about the first of July. I have latterly used Pearson's improved wheat drill with good effect: as at present gauged, it sows about 1½ bushel to the acre. Where the ground is properly prepared, it is a neat and expeditious method of putting in wheat. One hand with two horses will drill in 8 acres in a day. I have been accustomed to immerse my seed wheat in brine, principally for the purpose of cleansing it, stirring in, when partially dry, as much plaster as would adhere to it; but have ceased the practice since using the drill, as it interferes with the proper distribution of the grain in the drill-boxes. The best fertilizers I have tried are leached ashes and lime; the former is

used as a top-dressing, preceding the operation of the drill upon land cultivated the previous year in corn, at the rate of 100 bushels to the acre; the latter, after being slaked, is spread upon the land, after the ground is flushed and made ready for the crop, at the rate of 60 bushels per acre. Our method of cultivating green clover fallow for wheat has scarcely ever failed of success, even in the most disastrous seasons. We commence ploughing in the latter part of May, soon after the clover begins to blossom, using Davis's three-horse plough, set to run about 8 inches deep; it does its work very handsomely, turning the clover well under, if the stock has not been permitted to tangle it; this operation is followed by the harrow, which closes up the interstices, and in the month of August we stir the ground with small ploughs, which throws the decomposed vegetable matter near the surface, and, after a dressing with the harrow, the field is ready for the drill; but when the seed is to be sown broadcast, the harrowing should be omitted till after it is sown. Where the ground is well set in clover, a cultivation of this kind, without the aid of manure, is good for 20 bushels of wheat to the acre. It is usual with us to turn the clover in the second year, mowing the field in the mean time, and sowing it once with plaster, at the rate of 3 pecks to the acre. The price of wheat at our landings, for the last five years, has averaged about $1.10 per bushel. I do not cultivate oats as a crop, but merely for the use of the stock. I have found by experience that the kind known as the white brier corn (so called from the roughness of the ear to the touch) is the most prolific on our soil. We endeavour to break up the sod as deep as 9 inches, and plant the corn at a distance of 18 inches, in rows 4½ feet apart: for its cultivation we rely principally upon the plough, using the harrow only occasionally. The average product is about 10 barrels, or 50 bushels per acre. I am, very respectfully,

Your obedient servant,

JOSEPH COUDON.

South Hadley Falls, Hampshire County, Mass., December 22d, 1850.

Sir:—It is with pleasure I comply with your request to furnish some information in relation to a few of the questions proposed in your circular. The season past has been more than usually productive for grass. Other crops a fair average, except apples and potatoes, the latter of which have suffered more from the disease than ever before. The best variety here is the peach-blow or sand-lake, being productive, good for the table, and having thus far withstood the blight better than any other kind. The tobacco crop is becoming one of our staple commodities. The amount grown on the banks of the Connecticut the past season, say, from the vicinity of Hartford, Conn., to about 40 miles up the river, is about 800 tons, and has all been sold at prices ranging from 10 to 18 cents per pound, averaging about 12½ cents. The variety raised is known by the name of Connecticut Seed Leaf. It is used for segar-wrappers, being a large thin leaf, a single one often measuring more than 3 feet in length by 14 to 16 inches in width. A fair average, on good ground, is 1600 pounds to the acre, though much more is often produced. I raised, on 1¼ acre, the past season, 2662 pounds, and sold it at my door for 14 cents per pound, amounting to $368.90. The ground must be made rich, and much care is required while growing to keep it free

from weeds and worms. When ripe, it is cut and hung in sheds (made for that purpose) to cure: it should hang till perfectly dry, which will take from 8 to 10 weeks; it is then taken down in a damp or rainy time, that the leaves may not be broken and stripped from the stalk, tied into bands of about half a pound each, and then it is ready for sale. It is bought up by dealers, who press it into boxes of about 400 lbs. each, and sent to market. They have received large profits on the last year's purchases. I consider that 10 cords of stable manure (worth $3 per cord) are sufficient for an acre, to produce a good crop. A fair compensation for carting manure and cultivating 1 acre would be $50; deduct one-half the cost of manure ($15) which remains in the ground, and the whole cost would be $65.

Neat Stock.—In reply to your inquiry, whether a given amount of food will produce more meat in a Durham, Devon, or Hereford, than in a native animal, I can best express my opinion and experience by quoting from the "American Herd Book," published by L. F. Allen, Esq. "Were the short-horns generally introduced into our great cattle districts upon the strong soils, and crossed upon our native stock, up to three-fourths and seven-eighths blood, there can be no question but 1 to 2 years in maturing would be gained, with increased weight of carcass; and, to say the least, an equal quantity of beef, with a diminished consumption of food. The market value of the flesh, too, would be enhanced; that is, a greater weight of mess beef can be cut from a short-horn than a native animal. The brisket, crop, plate, loin, and rump, in the one, being much heavier, relatively, than in the other. The peculiar mellow handling of the short-horn is also indicative of a superior quality in the flesh, adding to its selling price on foot, and rendering it easier of support, on a less quantity of food. So, too, with the milking qualities of the cow. The milk of the short-horn is proverbially rich; the quantity is also increased; and we have no hesitation in asserting that an average herd of high grade short-horns will yield, with a proportionate weight of carcass to the animal, and an equal consumption of food in the aggregate, at least 10 per cent. more butter and cheese, than a like herd of common cows. Many accurate judges estimate it higher; but we are content with this low scale of superiority, sufficient, at all events, to induce a reform in the entire dairy system of our country. With many, it may be considered a minor question; but the profitable disposition of the cow, after her dairy qualities shall have been exhausted, should not be disregarded. It is important that she be turned to good account always; and, having performed her whole duty at the pail, she should finally yield her full quota of profit in a valuable carcass. All this can be effected with the short-horn in a superior degree, as those powers of secretion which make her unrivalled at the pail, will, when turned in an opposite direction, equally prove her excellence in the shambles.

We do hope, that the day is not far distant, when our farmers themselves will, in their flocks and their herds, pay such attention to their breeding, and their quality, as shall make them objects of high interest, not only to themselves, but to their families; and to that degree, that such interest shall not abate, but increase, with age and experience. We indulge the anticipation, not altogether that our noble race of short-horns are to become the *universal* cattle of America, but that some of the improved races of neat cattle shall everywhere predominate, circumstances permitting; and this pleasing and important branch of agriculture shall receive the consideration to which it is so strongly entitled. So far as climate is concerned, they

have flourished equally well in all the Northern, Middle, and upper Southern States. A good and productive soil, yielding an abundance of pasturage in summer, with a fair quantity of winter forage, will content them. True, short-horns are moderate consumers, compared with their capacity to yield both milk and flesh."

Yours, respectfully,

PAOLI LATHROP.

Lockington, Shelby County, Ohio, December 21st, 1850.

Sir:—A friend sent me, last winter, a work emanating from the Patent Office. I almost immediately lent it to a friend who has gone West, and wished to learn how to raise the Osage orange. I am anxious to obtain a copy of your next volume, and, though the statistics of our common country will soon be laid before you, (imperfect to some extent, of course,) yet there is much we must learn aside from them. 1st. Why do we not more frequently change our own acclimated wheat, say from Canada and New York or New England best varieties to our Ohio and Western soils? We lose every other crop, in some vicinities, by rust, fly, or wireworm; even this season, half of our fields here were ruined by a worm. 'Tis true, the grasshopper eat off the early sown: but that sown from 20th September to 10th October, was greatly injured by the worm. On pulling up stalks, a small worm was found, $\frac{1}{8}$ to $\frac{1}{2}$ inch long, in the heart of the young shoot, striated, brown and yellow, having the general characteristics of the common wireworm, unknown before in wheat here. A good variety of spring wheat is much needed in N. W. Ohio. Can any one tell how to change a Southern winter into a Northern spring wheat? Two or three of us have tried and failed: but one variety exists in nature; climate and cultivation do the rest. Wheat is an annual in growth,—but seeding the ground after maturity, and, of course, can be brought back to its original state. There is no such thing in nature as spring wheat whose seed would perish if sown in the fall.

Information with regard to the cultivation of the Osage Orange.—Four times out of five, we fail here; some of our best farmers in the Miami valley have tried on all kinds of earth common to this country, and have failed. I tried in one year on heavy upland clay, side-hill gravel, and deep, sandy loam, in bottoms, and failed, while a few of the *same* seeds were taken to Rochester, New York, and did well, sowed dry in a garden. We sow, after laying out in the frost, dry, soaked in cold water, tepid, and boiling water; yet if any one succeeds, it is only with a few plants—an exception to the rule, *fail*. Fancy-gardeners may do better. We need the orange here, and in the 'Sciota valley, nearly as much as in Illinois. I hope the able correspondent of your office, Dr. ———, of Jacksonville, Illinois, will inform the public of his successful mode of cultivation, and whether the orange, like the Morus Nigri, Acacia, the Ailanthus, and Catalpa, will not send out new scions, if the plough comes near the roots; if so, your hedge will soon be a forest. Will not all these varieties bear grafting on each other? I think so; all but the orange, I know will. Any information relative to the above, would be of great value to our agriculturists, as this is the season when we prepare for spring labor. I trust the President's suggestion, with regard to a Bureau of Agriculture, may meet with favor. Science will do much,

but practical knowledge is what our farmers want: they are not educated for fancy farming, or gardening, but are tillers of the *earth*—I wish I could, with propriety, say *soil*. You will pardon my troubling you; I trust and hope by another year to be able to give you some information in return.

Respectfully, your obedient servant,

JAMES COOK.

FRUIT CULTURE IN MICHIGAN.

Detroit, January 2d, 1851.

Sir:—In Oakland county, where I have resided for 11 years, the culture of fruit has received increased attention. Good apples have brought from $1.25 to $3.00 per barrel of 2½ bushels. At 50 cents per bushel, the lowest price for apples of the first quality, there has been realized more net profit per acre, from the land in orchards, than from any other crop our farmers have raised. A farmer living near me, who has only about 1½ acre in orchard of cultivated fruit, has sold, some years, over $400 worth of apples. Unfortunately, the orchards first planted here were mostly of natural fruit; these have, in many instances, been grafted by persons who go from farm to farm every spring for that purpose, and the result has been that the fruit of a large portion of the trees thus grafted proves of little value for market. Some improvement, however, has been made in the fruit, but the trees have been very much disfigured, owing to the incompetency of those performing the operation, and an inconvenient mixing of fruit, by grafting several kinds of apples upon the same tree. A tree grafted or inoculated when small, is far preferable to one altered over when grown large, for several reasons, one of which is its increased length of limb, and another is, it cannot be so well shaped as while young, for then the head may be so formed as to produce more fruit and of better quality than trees of the same age and size altered over; and besides, what is of some importance, they will have symmetry, instead of being unsightly objects. Farmers have made a great mistake in grafting large varieties, without regard to quality. Apples of large size are invariably coarse and inferior for the table, and are liable to be blown from the tree, and the result is that three-fourths of them fall prematurely. This is a decided objection, as far as profit is concerned, even if they were of good quality. I have a decided objection to a great number of varieties. Suppose a farmer has 100 apple-trees, and 50 varieties of fruit: now, he cannot well have more than 3 or 4 trees of any one kind; and in 50 varieties he will of course have early, summer, fall, and winter fruit, and the result will be, he will have to keep running to market all summer and fall, and many times with half a load. Would it not be better to have, say, 80 trees of good winter apples, and 20 trees of other varieties, merely for family use; then the apples for market could be all gathered at one time, and marketed after the most important business of the farm is over. Let these 80 trees be of the best varieties, and those that bear well. The Rhode Island Greening, Swaar, Spitzenburg, Westfield, Seek-no-further, and Roxbury Russet, are good varieties, and bear well in this climate. If only two varieties were to be selected, I would prefer the Greening and Spitzenberg, as producing the most fruit and of the best quality. A farmer

of my acquaintance put up last fall 120 barrels of apples from 20 trees, and they were worth in Detroit $1.50 per barrel. I know of no farming products that would net as much, or any thing like it. An apple that originated at Kingston, New York, and introduced by Judge Buel, called the Jonathan, I find to be a very valuable variety. Out of 70 or 80 varieties I have fruited within the last 6 years, I think this is one of the best. It is a great annual bearer. This fruit is ripe in November, and keeps well till May. It is of medium size, good flavor, and invariably fair, and withal a very handsome apple. Skin thin and smooth, the ground clear light yellow, nearly covered by lively red stripes; stalk three-fourths of an inch long, and rather slender, and inserted in a deep, regular cavity; calyx set in a deep, broad basin; flesh, white, tender, and juicy. Much has been said and written upon the importance of picking fruit carefully, and of packing it properly. Full directions have been given at various times, in nearly all the agricultural journals. It is absolutely necessary that fruit, in order to have it keep well, should be picked by hand, and after being carefully picked, it should be placed in the barrels by hand, and when the barrel is full it should be shaken gently, that the fruit may settle together, so as not to move in the barrel by carriage. The barrel should be full, that the head may press firmly upon the fruit. The barrels should never be placed upon the head after they are filled, but should be carefully packed away upon the bilge, in a shed or other out-building, and kept dry till the weather becomes cool enough for the mercury to fall below 30°, when they may be placed in a cool, dry cellar. Apples will not injure at a temperature 2 or 3 degrees below freezing; but if they could be kept at freezing point, they would remain perfectly sound for almost any length of time, if kept dry.

I submit a few remarks upon grafting apple-trees. It is the usual practice to graft the extremities of the limbs, or to cut them where they are not more than 2 inches in diameter. Now, I consider it important to cut the limb near the main stock; no matter if it is 5 inches in diameter; it will do better, and make a more perfect tree, and produce more fruit. To graft small trees, cut them off below the surface of the ground, and graft in the usual way of cleft-grafting; then replace the earth around the stem, and the work is done. For grafting above-ground, a composition, made of three parts rosin, two parts beeswax, and one part tallow, melted together, and applied with a brush while warm, (it should not be hot,) is a good composition. Split the stock to be grafted in the centre with a knife and mallet, drive in a wooden wedge to open and hold till the scions are inserted. The scion should be of the last year's growth, and wedge-shaped at the end to be inserted; put one upon each side of the stock, so that the inner bark of both the limb and scion may come in contact; then take out the wedge, and the scions will be held firmly: now, to finish the operation, apply the composition as above directed. If both scions should live, let them grow till the next spring, when it would be well to cut out one of them. In preparing the ground for an orchard, it is important to have a deep rich soil. For manure, a compost is generally recommended, which, no doubt, would be preferable; but I am satisfied that almost any kind of manure will answer, if it is buried deep in the soil. I would recommend that as much manure should be spread upon the ground as can be turned under with a large plough; then have two good teams, and let the latter plough be set off so as to follow in the furrow of the first, that the subsoil may be brought up and turned upon the sod. I have had land ploughed 12 inches deep in

this way, with a pair of horses, by changing the set of the plough every time of coming round. I am satisfied that this is a good operation. By having two teams of sufficient power, the ground may be broken to the depth of 16 inches. If the land be thus treated, the trees may be set without further preparation, and will succeed better than they will by merely digging large holes, as is often recommended. The usual distance is about 2 rods each way. Where peaches do well, and it is profitable to raise them, they can be planted between the rows of apple-trees, as they will die out before the space will be required for the apple-trees. It will require 40 trees to the acre, at the above distance.

Very respectfully, your ob't servant,

A. C. HUBBARD.

P. S.—The above remarks are respectfully submitted, which you are at liberty to use as you see fit. They have been written in haste, and without having been reviewed. A. C. H.

Washington, Macomb County, Michigan, December 16th, 1850.

Sir:—In reply to your circular of August 26, 1850, I would give you some hints for the benefit of professional men and mechanics, who never, or seldom keep but one cow and one hog. This practice is generally considered a matter of economy, is to keep one hog, as the milk of the cow, over and above what is used in a small family, together with other rejected morsels from the table, will keep the hog very well, without much extra expense.

Now, the idea I wish to suggest is, to dispense with the hog entirely, and feed to the cow all that is usually given to the hog. There is no difficulty in learning the cow to eat all the milk, &c. I will give you the result of the experience of a neighbor, a physician by profession and practice, as well as a rigid economist. My immediate neighbor, Dr. D. Cooley, has, for several years, pursued the above plan, and I will give you a brief sketch of the result.

In the year 1849, Mrs. C. kept an account of the butter made in 3 months, June, July, and August, as follows:

In June	$52\frac{3}{16}$	pounds.
July	$44\frac{10}{16}$	"
August	$46\frac{7}{16}$	"
	$143\frac{4}{16}$	"

In the summer of 1850, the same lady kept an account for six months, with the same treatment of the cow, beginning with May, and ending with October. The following is the result for 1850:

May	$34\frac{7}{16}$	pounds.
June	$38\frac{5}{16}$	"
July	$36\frac{3}{16}$	"
August	$35\frac{2}{16}$	"
September	$26\frac{3}{16}$	"
October	$36\frac{11}{16}$	"
Aggregate	$211\frac{5}{16}$	"

This cow was 6 years old in the spring of 1849, of good size, though not above the medium size. She grazed in a common pasture of timothy and clover, and was fed the slops of the house, as above stated.

The family consisted of three adult persons, and one child 10 years old. All the milk and cream was used that was wanted in the family, and the balance set for butter, which produced the above amount. You will see that the months of June, July, and August produced about 33 pounds more than the corresponding months in 1850. The deficiency in 1850 is readily accounted for, from the fact that the first season had been very dry and the pasture very poor.

I believe it is not generally expected of one cow to supply a family with butter, but only milk and cream for ordinary use. Now, this cow has done all that, and produced over 200 pounds of butter in 6 months, with only the extra feed that is ordinarily given to a hog. Butter is worth, on an average, 12½ cents per pound. Pork is worth from 3 to 37½ cents per pound. *Quere*—Would the slops of the house fed to a hog, instead of a cow, have produced $25 worth of pork in 6 months?

If the above hints are worth correcting and revising for use, you are at liberty to do so, and make such use of them as you please.

Very respectfully, your ob't,

G. W. KNAPP

ROOT CROPS.

Having been engaged, for the past eighteen years, as one of the firm of E. Risley & Co., in horticultural pursuits, I have given considerable attention to the growing of roots, being forced to raise large quantities every year, that we might have good selections for the raising of seed, which has been the principal object. We have had many to feed, yearly, to our horses and cattle.

For feeding, we give carrots (the long orange) the preference over all roots. Beets, for cows giving milk, are rich, sweet food, and preferable to turnips; but for working oxen and horses, no food, for winter and spring feed, in my opinion, equals carrots. To feed them in the winter, a cellar, attached to the stable, is indispensable.

One and a half bushels of carrots about equals, in substance, one bushel oats. Horses, that have been stiffened by hard work and high feed on grain, can be much renovated by a change to carrots for a few weeks, and it is the next thing to a run in forest grass.

Having obtained the premium every year from the New York State Agricultural Society since its organization, perhaps it would not be amiss to give the statement of crops and expense of raising.

On one acre of land, in 1846, we raised 1590¼ bushels of carrots, 56 lbs. to the bushel, at the following expense:

25	loads of manure, 62½ cents	$15.62
1½	days ploughing, $1.25	1.88
20	" raking and sowing, 62½ cents	12.50
30	" weeding and thinning, first time, 62½ cents	18.75
20	" " " second time, 62½ cents	12.50
12	" hoeing " third time, 62½ cents	7·50

36 days harvesting, 62½ cents	$22.50
Improvement on land	10.50
6 lbs. seed, 50 cents	3.00
	$104.75

Or a little more than 6½ cents per bushel. In 1847, on half acre, 498 bushels, on green-sward, turned over and harrowed after rolling down, at an expense of $25.76, or a little over 5 cents per bushel. Same year, on ⅞ acre of land, on which carrots had been raised the two preceding years, 826½ bushels, at an expense of $42.69, or a little less than 5 cents per bushel.

In 1848, on one acre, 966 bushels, at an expense of $50.10, or a little over 5 cents per bushel.

In 1849, on 1⅜ acres, 2318½ bushels, at an expense of $54.37, only about 2⅓ cents per bushel.

In 1850, on 1 acre, 951½ bushels, at an expense of $46.63, or a little less than 5 cents per bushel.

The aforesaid crops were all raised on land of about the same quality, and, on the same land, some for 3, and some for 4 years in succession. Rich green sward, turned over and sowed, produces good crops, and at less expense than land kept under the plough and hoe for years, as weeds are much less troublesome, which are the farmer's dread, and discourage many from trying a second crop; yet, but few crops pay better for a little pains and patience.

Sow in drills from 12 to 14 inches apart, and, as soon as they can be seen, hoe them through with a common hoe, to stir the ground between the rows, which prevents weeds from starting. As soon they are fairly up, hoe again, and then thin out to from 2 to 4 inches in the row. I have never known the crop injured by insect or worm. By soaking the seed before sowing, will forward the crop, and keep it ahead of weeds, and much labor will be saved. I raise sweet potatoes in this latitude, 42¼°, by starting them in a hot-bed, for my family's use. Seed should be procured from farther south every season, to prevent degeneration. I raised, this season, over 20 bushels on 50 feet square.

I, last fall, fed two pigs, and as I think it is more healthy for a hog to grunt than squeal, I gave them all they would eat, and found that 4 quarts of meal, wet with cold water, was no more than they would eat at one time. I also found that 16 quarts would thicken 8 pails of boiling water to a pudding, which they would not eat at 6 times.

In this place, the warmest day in 1850 was July 16th; 11 o'clock, A. M. 94½°; average, 85⅔°. Coldest day, December 31; 7 o'clock, A. M., 6 below zero; average, 17½° above.

The mean temperature for each month:

January ..... 34 7/31°	May ..... 56 14/31°	September ..... 66 16/30°
February 31½	June 74 9/30	October 55 20/31
March 39½	July 77 10/31	November 49 2/30
April 48 28/30	August 75 6/31	December 29 26/31

Mean temperature for 1850, 53½°.

LEVI RISLEY.

Fredonia, Chautauque County, New York, December, 1850.

North Harpersfield, January 1st, 1851.

Sir:—The number of acres in this vicinity under the plough has been on the decrease for some number of seasons, perhaps towards twenty; and this for two reasons: one was, (and that might have been sufficient,) that the returns of ploughing, sowing, and harvesting, was generally a meagre pittance: another was, that the cheapness and fertility of Western land, with their easy means of transporting to market, rendering competition from this vicinity entirely abortive. It therefore requires no sophistry to prove that a wrong course has been pursued in the managing of farms; and, indeed, excessive ploughing has been followed by (almost equally ruinous) excessive feeding, or pasturing, and mowing; even meadows are allowed but a short season of rest, from the earth-treading hoof; grass lands are left in late autumn, without any covering to shield them from the severity of the wintry blast.

Now, I would propose the keeping of less stock: the stock would present a healthier appearance, would arrive at maturity much quicker, (which is an important item,) and, no doubt, would be more profitable. Another reason, and stronger still, is, the land would improve; the grass left on in the fall would keep the land warm in winter, and would hasten vegetation in the spring, by its decay. By these means, land would improve; but it is evident, it can be improved much faster by a judicious system of ploughing and manuring. There is but little manure made, saved, and applied, to what might be; as evidence of this, I can point to those who manufacture two loads for every acre they possess; and to others, who do not apply as much as one for every two acres; and this, too, of an inferior quality, being bleached and drenched by sun and rain. Of the different and scientific ways of obtaining fertilizers, I shall not speak—only of their application. To improve a piece of land which has been too much worn by the plough, and has lain in grass some time, I would prefer corn for the first crop: it will depend on the nature of the soil, and its locality, whether it should be broken up in the fall, which may be done to advantage where the soil is not light, sandy, or exposed to severe wind. After the land is ploughed, which should be done very nice, it may remain, with the exception of a slight harrowing occasionally, until near the time for planting, which is the middle of May. It should then be allowed a coat of coarse manure, which should, by harrowing and ploughing, be well mixed with the surface soil; then, if you would have a good growth of fodder, with ears of corn well filled, and ripe before the frost, furrow the ground, and manure in the hill, with a compost from the hog-pen and hen-house, with a mixture of ashes or plaster, or both; 12 or 15 good cart-loads to the acre will work wonders. The rows should be 3½ feet apart, running north and south, the hills 2½ feet in the row. Special pains must be taken in planting; 5 or 6 kernels to the hill should be allowed, which should be covered an inch and a half deep, the hill being left no higher than a level with the surrounding surface. If possible, each hill should have a small handful of ashes or plaster before the plants appear above the ground. The after-culture should be thorough, stirring the soil with the plough and hoe as often as possible, the more the better, not hilling the plants until the appearing of the tassle. No weeds or grass should be allowed to start, which they cannot do, if the ground is worked half as often as it should be. When about one-half of the corn on the ear is ripe and hard, and the other half well glazed, the

corn should be cut from the ground, and stood up, in as small bundles as may be and have them stand up good. As soon as the stalks are thoroughly dried, the corn should be husked off, and the stalks put in a barn. They make good fodder.

By the opperation above described, if thoroughly performed, from 25 to 50 bushels of corn, and an amount of fodder equal in substance to at least a ton of good hay, may be obtained from an acre, while the land will be improved in quality, and in a condition easily prepared for another crop, which may be winter wheat or rye, if the ground does not heave too much by frosts; if sown with either of these, it should be done as soon as the corn can be taken from the ground. Wheat or rye should be sown at the rate of 1½ bushel per acre after the ground has been made mellow by ploughing, or smooth by harrowing. If the land is intended for meadow, it should have 6 or 8 quarts of timothy seed per acre, sown when the grain is with from 4 to 6 quarts of clover seed sown early in the spring. If spring grain is preferred to winter grain, wheat, barley, or oats are good crops, and good to seed, or stock down with; if these are sown, the ground should be ploughed as early in spring as possible, the land being free from frost, and not too wet: it should be cross-ploughed and harrowed smooth before sown, and well harrowed afterwards. Wheat should be sown 1½, and barley and oats 3 bushels to the acre; timothy and clover with 6 quarts of the former, and 4 of the latter; the acre should be sown on previous to the last harrowing.

Grain of all kinds, it is allowed, should be cut before it is what is called fully ripe, as the grain will make more and better flour, and the stalk will be more palatable and nourishing for animal food, which is very important in this latitude. The sooner any green fodder, calculated for animal food, is thoroughly hayed or dried, and put in the barn, the better, as it is very injurious to have it bleached by sun and rain, or dew. Immediately after the crop is taken off, it is a very common practice to allow the young grass and clover to be eaten off, or trodden down by stock, which should in no instance be allowed. If the land is intended for meadow, the less it is fed off the better; no hoof should be allowed to range over it until it has lain in grass one summer, when it will do to feed it off some. If it is wanted for pasturage, it should lie without being fed until the next June, when the grass will have acquired a good hold of the soil; and then it must not be eaten off close, leaving the ground naked.

If, by this manner, one field is improved, it may remain from 2 to 8 years, (but never until the grass runs out,) while another, or several fields in succession, may undergo the like, or a similar process, varying the manure, the manner of culture, the seed, &c., as circumstances seem to require or judgment dictate.

With regard to different breeds of cattle, I would remark, that a species of stock, suitable for a warm climate, a level (or not mountainous) country, and very rich grazing lands, might be poorly calculated for this region. For this rough, uneven part of the country, perhaps Devon cattle are the most suitable, as they combine the most of the qualities required in a species of stock. Considering the market value of land, the price of labor, the distance from market, together with the great length of winter, and shortness of summer, it is no easy matter to sell a hundred dollars' worth from a farm. Yet, with all these hindrances, a farmer, by thorough and judicious management, may realize a handsome profit from his expenditures.

As a general thing, taking one year with another, a calf can be raised or afforded at 6 months old for $3; a yearling, in the fall, at $7; a two-year old, in the fall, at $15; a good cow, in the fall of the year, for $18—in the spring, for from $25 to $30; 100 pounds of butter for $14; 100 pounds of pork for $5, made mostly from the proceeds of the dairy.

There are very few farmers who can afford to raise grain to sell; if they do, they must be governed by New York market prices.

Wool-growing, together with the rearing of lambs for market, will, perhaps, (counting all expenditures,) return the greatest profit. I have a flock of Merino sheep which average over 5 pounds of well-washed wool per head per annum, which wool costs me, one year with another, from 25 to 30 cts. per pound. Mine is as fine as any Merino wool that I am acquainted with. One more item, and I am done. There is but little irrigation practised in this country, and that little is generally in an imperfect manner; hence, I would urge those having experience in this branch of business to write upon the subject, publishing an account of their way and its effects.

With these remarks, I am yours,

N. M. DART.

New Harmony, Indiana, July 15th, 1850.

Dear Sir:—The object of the present communication is to relate the strange phenomenon which has occurred along our river—the cane Arundinaria Gigantea (*Michaux*) going to seed this year.

Michaux, in his description, states that it goes to seed once in from 20 to 25 years. I have been a resident of the Wabash upwards of 30 years, and it never having occurred before, has caused me to make some inquiries of those whose residence was many years in advance of me, and they state that it never has happened on this river before.

If my memory is correct, in the year 1830 or '31, in descending the Mississippi, I noticed a similar circumstance. The planters collected and used the seed for feeding to their stock. It must possess much nourishment, as I was informed that the stock on the Mississippi were that year remarkably fat. My son Charles informs me that the squirrels he killed a few days ago, in the cane, were literally covered with fat. Trusting that the seed herewith enclosed may add to the collection of the Patent Office, I subscribe myself

Yours very respectfully,

WM. AUG. TWIGG, P. M.

Hon. Commissioner of Patents, Washington.

Ashland, Ashland County, Ohio, January, 1850.

Sir:—The varieties of wheat in this portion of country are Asbridge, white blue-stem, Mediterranean, stubble, mountain sprout, valley, white flint, red-chaff bearded, three varieties of club wheat, and many others. Our soil and climate being congenial to the production of this important staple, our farmers have spared no pains in introducing the best varieties. The two first named have precedence over all others with which I am acquainted, either from experience or from inquiry. They exhibit a plump white berry, with thin bran and bald head, which last renders them far moro

pleasant to handle than bearded wheat. Under favorable culture and suffering no calamity, they will yield 30 bushels per acre. The Mediterranean is extensively sown on account of its enduring the winter better and being fly-proof, and thus escaping two great injuries. The objections to it by some are its reddish brown color, its light yield, and its liability to fall from slight winds. All the other kinds possess each some peculiarities which render them estimable or objectionable with the farmer. The club wheat has two high recommendations: 1st. That of enduring a storm that would prostrate all other varieties; 2d. It grows erect, and yields well on rich bottom lands. The Asbridge, white blue-stem, and white flint are the most highly esteemed. The Asbridge possesses the greatest number of important peculiarities. The average product per acre is 15 bushels. Time of seeding from the middle of September to the 1st of October; but more good crops are obtained by sowing as near the 20th of September as possible. If we sow before that time, we give license to the fly, because there is usually much warm weather about that time, and, if we sow much later, it is frequently winter-killed. The time of harvesting is from the 4th to the 10th of July. The quantity sown per acre is from 1¼ to 1½ bushel, without any preparation, with the exception, in a few instances, of having it clean. A vast quantity of wheat is sown upon inverted oat-stubble previously manured. The depth to which we usually plough is 9 inches. We plough fallows about the 1st of June, about 6 inches deep—manure just before sowing, then plough 10 inches deep. The yield has been increasing for the last 5 years, because there has been an improvement in the system of culture; the cause of which, in a great measure, must be credited to the influence of a good agricultural paper (The Ohio Cultivator) which circulates among us. If it would not be foreign to the object of this Report, I would here speak in high terms of that excellent paper.

The system of rotation upon uplands is first oats or corn, then wheat, then seed to clover or timothy. Those who cultivate only 50 or 60 acres, usually raise two crops of wheat upon the same field successively before seeding down. This will answer well, provided the soil is sufficiently fertile. The bottom lands are sometimes cultivated in corn for several years in succession, without any apparent exhaustion of the soil, provided the corn is husked upon the standing stalks, and fed in that way.

The best remedy for the Hessian-fly is to sow as near the 20th September as possible, for its depredations cease about the 23d, and the wheat becomes sufficiently rooted to withstand the winter. From special observation upon this matter, I can safely say that, by observing the above remedy, the wheat crop in the aggregate would be increased one-fifth. The weevil was destructive to the wheat crop of 1848, just before harvest, and for which I know of no remedy. The average price at our nearest market is 70 cents per bushel.

Corn.—The varieties are numerous. The most esteemed of which are the large yellow, white flint, and small yellow. The large yellow grows very tall, has long ears, ripens tolerably early, and is much esteemed by many. The white flint, so called because its grain is very hard, has a short thick ear, is hard to husk and hard to shell. It moulds in the husk easily in a wet time. It weighs 60 lbs. to the bushel, and makes excellent white meal. The small yellow possesses the greatest number of advantages: 1st. Its early maturity; 2d. Its small growth, which renders it susceptible of close planting; 3d. It is therefore more easily cultivated, easy to husk,

not liable to damage by wet at husking-time, and yields more corn with less labor than any other with which I am acquainted. The average product of this variety upon good bottom land and with good culture is 100 bushels of shelled corn per acre. The average yield of corn in general is 50 bushels per acre. Cost of production is 8 cents per bushel. The best system of culture is to check, and plant corn of short growth 2 feet 10 inches apart, and pass once each way between the rows, at each time of hoeing, with a shovel-plough, and that will throw fresh ground against both rows. This method saves two-thirds of the expense of ploughing, and produces nearly double the quantity generally raised. Corn of tall growth must of necessity be planted about 4 feet apart, and it requires ploughing 3 or 4 times between the rows. Corn is in the best condition for feeding when ground. The difference in favor of cooking is not sufficient to warrant the expense. Corn meal, fed in the form of thick swill, is the most advantageous. The manure of 20 bushels of corn consumed by hogs, if carefully saved and well applied, will add about 2 bushels per acre.*

Oats.—The average yield is 30 bushels per acre. The quantity of seed sown per acre is two bushels. This crop is very exhausting to the soil.

Rye.—The average yield per acre is 20 bushels.

Peas are not cultivated to any extent as a field crop, either for profit or for renovating the land.

Clover and Grasses.—The quantity of hay cut per acre is one ton of clover and one and a half of timothy. The best fertilizers for meadows, so far as my experience goes, is to scatter the droppings of cattle and horses, which is done most easily by knocking them about with a 4-foot stick, shaped like a sled-runner, in the spring of the year, just before the vegetation starts. This kind of manure pulverizes very fine, if scattered in that way. I know by experience that if the soil is pretty well represented with droppings, and thus treated, the yield will be at least one-third more than if they were not scattered. Timothy is preferred for seeding down meadows. The quantity of seed sown is 4 quarts per acre. The cost of raising hay per ton is $1.50.

Dairy Husbandry.—The average yield of butter per week, for each cow, is 4 lbs., and of cheese 8 lbs. One of the best methods for treating milk for butter is to skim before the milk is sour, and churn immediately. This mode brings good butter in a short time, if the cream is at the right temperature, say 55 degrees. The modes of churning are various, but we generally use the barrel churn and dasher churn. A good improved churn, upon the atmospheric principle, would meet with general approbation here. The mode of putting down butter for exportation is to pack it in kegs containing about 180 lbs. The average price of butter is 9 cents, and that of cheese 5½ cents per lb.

Neat Cattle.—The cost of raising till 3 years old is about $15, which is about what they sell for at that age. So there is comparatively little attention paid to this department. They are only raised as a means of converting our pastures into cash, with little or no profit. The value of good dairy-cows in the spring is about $14, and in the fall about $12, at which time they usually go dry. They are generally wintered on good straw,

* Our correspondent is mistaken if he supposes that land in his county is generally so fertile that the manure made from 20 bushels of corn, all saved and properly applied, would add only 2 bushels per acre to the crop. Let the experiment be fairly made on a soil of medium quality, and we venture to predict that the gain will be at least 10 bushels.—Ed.

which is better than hay for them. The number of pounds of beef that 100 lbs. of corn will produce is about 20.

I can say nothing definite respecting the relative fattening qualities of the Durhams, Devons, or Herefords. The two latter are not raised as distinct breeds to any extent in this part of the State. The Durhams are mostly noted for their neat appearance, exhibiting a prominent disposition to fatten easily. The native breeds are distinguished for their good milking qualities. This county possesses some of the very best milkers.

Sheep and Wool.—Wool-growing is profitable. The cost of growing coarse wool here is 15 cents per lb., and for fine wool 12 cents. A ton of good hay, judiciously fed, will produce 35 lbs. of wool. Small or ordinary sized sheep, of fine wool, lengthy staple, are now generally acknowledged to be the most profitable, such as a cross of the French and Spanish Merino. I rejoice that this great and long-sought object has finally been attained—lengthy staple with fine wool. There are a great many native sheep in this county, which are improved in fineness by a cross with Merinos. They are hardy, grow large, and sell readily to the butcher. The proportion of lambs annually raised to the number of ewes, under good management, will be 5 lambs to 4 ewes, among the natives.

Hogs.—The best breeds, from what I have learned from experience and inquiry, are a cross of the Berkshire and China breeds, or of the Berkshire and grass breed. I would prefer the first named, as a hog the most docile and profitable. Of this kind I killed 4 pigs, at five months old, which dressed 89 lbs. each, without any other effort at feeding. They are very highly esteemed, because they fatten so easily, and at any age, with but little expense. If they are pigged in March, they may be butchered in November, and will weigh 200 lbs. If 100 lbs. of corn be fed to a pig of good quality, it will make 25 lbs. of pork. My method of putting up and curing pork for home consumption is, first to salt slightly in open casks, and let it stand one week, then pour off the brine, for it is generally bloody, and would taint the meat; then pour on strong fresh brine, and put on weight enough to keep every particle of meat perfectly submerged. Let it stand 4 or 6 weeks, according to the size of the pork, then hang it up and smoke with green hickory or sugar wood, until it shows a rich yellow color, then pack down in clean oats.

Hemp.—This article receives so little attention in this county, that I know nothing definite concerning it.

Potatoes.—The usual average yield is 40 bushels per acre. The cost of production is 10 cents per bushel. The most prolific varieties are the long red cudgels, pink-eyes, and peach-blow. The varieties for table use are the pink-eyes, and old, pure, blue Neshannocks. The best mode of culture is to plant on a loose, gravelly loam, ploughed 8 inches deep, and check for hills, 2 feet 10 inches apart, and 3 inches deep. This would leave a loose subsoil of 5 inches, which is highly necessary, that all superabundant water can readily filtrate. Lime alone is the best manure for potatoes. Lime and ashes have been used to prevent the rot, but without any effect.

Root Crops.—There is but little attention paid to these crops, except the turnip, which is mostly raised for table use. I do not believe this department will receive much attention, for it exhausts the soil incomparably faster than any other product. For example, I can raise but two root crops on rich bottom land, the first a good one, and the next a meagre one, which after that would yield a meagre crop of corn: whereas the same soil would

have produced 60 bushels of corn per acre, for 10 years in succession, without manure, which, of course, would be more profitable.

Fruit Culture.—Some farmers are paying quite a spirited attention to fruit, by way of grafting their seedlings. There can be enough raised on an acre to make it profitable. Mealy apples, having but little acidity, will compare well with potatoes for fattening pork. There is not enough attention paid to the culture of winter apples even for home consumption. Some of the best here are the Red Seek-no-further, Yellow Pippin, Vandevere, and Rambeau. The two last are extensively cultivated; the Rambeau for cider, and the latter for winter sauce and pies. No doubt a great variety of good winter fruit will be developed upon the great number of grafts which have been recently set upon the old seedlings.

Grapes.—I think the culture of the Isabella and Catawba could be made profitable here, for they both thrive and yield well.

Manure.—The plan regarded as the best for making and preserving manure from waste, is to keep all the stock enclosed in the barn-yard as much as possible, and all the feeding should be done in the yard. If there is a quantity of straw remaining in the spring, designed for manure in the fall, on wheat land, let it be thrown into the yard, and a half-bushel of lime to the ton of straw be scattered upon it. This, with the moisture of the yard, will decompose it in a short time. Neither lime nor plaster are used to any great extent. Lime is obtained at too great a distance from this for us to make a very extensive use of it, and plaster is only used occasionally on corn, but with signal benefit. Barnyard manure seems to answer all purposes for field crops. Lime is sometimes applied to potatoes, with good results. Guano has not yet been introduced here. This species of manure should be submitted to a chemical analysis to ascertain its properties, for it must possess the best combination of elements of any manure that has yet been tested. The time has come when the farmers of this portion of the State are beginning to feel the dignity of their station, and the independence of their position. Many an inconsiderate, repining farmer, with small income, if thrown upon other resources for a livelihood, it would cause him to reflect with pain upon his once exalted position.

HENRY MILLER, Jun.

At home, near Milledgeville, Georgia, December 1st, 1850.

Sir:—In reply to your circular of inquiries, I send you the following, which you may dispose of as you think best.

Wheat.—The varieties raised in this section are the big and little white, thered, and two or three kinds of bearded wheat. The little white has formerly had the preference over all others, until a few years since, when the fly began to be so troublesome, that farmers were compelled to seek for that variety which ripened earliest. The bearded wheat has been raised very extensively for the last year or two, on account of its early maturity, while the yield is thought to be greater than that of the little white. The big white is an excellent kind, but so uncertain that very few raise it. The average yield of wheat per acre is from 3 to 5 bushels; the time of seeding is from the middle of October to the last of November. Time of harvesting, the last of May or first of June. It is usually sown without any preparation, except sifting through a cockle sieve, to take out the cockle

and the imperfect grains of wheat. If the wheat is inclined to blast, it is soaked 12 hours in a solution of blue-stone, which is a certain preventive against that disease. Wheat is generally sown on corn land, and put in very roughly, the land being ploughed but once, though I am satisfied it would pay well to break up the land good before sowing, and to harrow the seed well in. I am inclined to think the yield per acre of this crop is increasing, from the fact that farmers pay more attention to it than formerly. We have no remedy for the fly but late sowing. The best remedy for the weevil is to get out the wheat as early as possible, and spread it out in the sun, say 5 or 10 bushels at a time, and let it remain till it gets very hot, then take it up and put it immediately into boxes or barrels, and cover tight until it cools. In a short time after it is put up, it will be hot enough to kill every weevil or worm in it, though it will not injure the grain. I believe, if wheat thus served was put into clean tight casks, it would keep several years. The average price of wheat this year has been $1.25 per bushel, and that of flour, from $8 to $9 per barrel.

Corn.—We have but two distinct varieties of corn, the white and the yellow, though there are different kinds of white, possessing different qualities. The yellow corn is thought to grow better on thin land than the white, and is generally believed to contain more nutriment. The average yield per acre is 5 bushels on poor land, and 15 to 20 on good land. The land should be well cleared and broke up before the corn is planted; then lay off the rows with a bull-tongue plough; drop the corn, and cover with the same kind of plough, making a ridge on the corn; and, before it comes up, scrape off the top of the ridge with a board attached to the foot of the plough-stock. If the season is favorable, the corn will be out of the ground in a few days, and in a week or ten days it will be high enough to admit the plough, when it is hoed out and replanted. In about three weeks, it is ploughed out with a shovel or turning-plough, the hoes following; and, three weeks after this, it is ploughed out with a sweep, and laid by with the hoes. The price of corn is $1 per bushel, and that of fodder $1 per 100 pounds.

Oats.—This crop was better than an average the past year, which may generally be put down at 15 to 20 bushels per acre, though 60 or 70 bushels are sometimes obtained. The quantity of seed varies from 3 pecks to a bushel per acre: price, 75 cents per bushel when cleaned, or the same price per hundred in the sheaf. Oats are generally considered to be an exhausting crop. Time of seeding, from the first of January to the last of February.

Barley is but little cultivated here, except in small lots, for feeding to stock while green, for which it excels every other grain. I believe that one acre of good land, sown in barley, would be worth $50 to any farmer; but it is useless to sow it on any other than rich land. The average yield of grain per acre is about 20 bushels. The quantity of seed per acre varies from 3 pecks to 3 bushels. Price, $1 per bushel.

Rye receives but little attention, as it yields but a small quantity of grain, though it will produce more straw, and exhaust land less, than any other grain we have. The quantity of seed used is 1 peck to the acre; the price per bushel is $1.

Peas are raised mostly between the corn, few fields being planted with them entire, though they improve the land very rapidly, when thus planted in the spring, and followed with rye in the fall.

Clover and Grasses.—Little or no attention paid to them.

Dairy Husbandry.—But little attention is paid to making butter and cheese for market. Every farmer tries to have as much milk and butter as he needs for his family; and as for cheese, there is none made in the county, to my knowledge.

Neat Cattle.—We have very few cattle, of any improved breed, among us. The usual price of beef is from 3 to 4 cents per pound. The price of milch-cows is about $10.

Sheep and Wool.—Wool-growing is a profitable business, but, owing to the depredations of dogs, no one seems willing to go into it on a large scale. Most farmers raise wool enough for their own use. The average yield of wool per head is 4 lbs., though perhaps large sheep might yield a little more, but of coarser quality. Wool is worth 25 cents per lb. in the fleece, or 50 cents when carded into rolls.

Cotton.—This crop has been rather below an average the past year. The storm in August injured it very much. The average yield of cotton in the seed is about 500 lbs. per acre. The crops which grow best with cotton are corn and wheat, or other small grain. The best preventive against rust and worms is lime, sowed in the drill at the time of planting, at the rate of one barrel to the acre. Cotton has commanded a higher price this winter than it has for several years, which has enabled a great many of our farmers to pay their debts, and get in a way to live; but others have gone in debt, and, should the price of cotton fall, they will be seriously injured.

Rice.—None raised, except in small patches, for home consumption, though it might be raised with profit, if the necessary attention was paid to it.

Root Crops.—The turnip crop was not so good the past year as formerly. Many farmers did not sow at all, but those who did, and succeeded in getting a stand, made good crops. The seed is usually sown broadcast, and raked or harrowed in, and the weeds and grass are pulled out by hand. Some, however, prefer to sow in ridges, about 18 inches apart, and work them. They can be chopped out to a stand, like cotton, which plan I prefer.

Potatoes have turned out rather sorry, owing to the dry weather in August and September, the principal months in which they grow.

Every farmer should, by all means, have his patch of fall cabbages. None but those who have tasted them can imagine how delicious they are. They are altogether different from those raised in spring. They are more tender to cook, and stand the freezes of winter when spring cabbages are all killed. They are much more easily raised, and should be sown the first of July; then the weeds will not grow much before the frost comes, but the cabbages will continue to grow every warm spell until Christmas.

Very respectfully yours,

WILLIAM C. DICKSON.

Springfield, Ohio, December 28th, 1850.

Sir:—The information called for by your circular of the 26th of August last is herewith submitted. I hope it will reach you in time for the purpose for which it is designed. Owing to a daily press of my official duties, I must necessarily be very succinct in my answers to the inquiries proposed. I have been compelled to rely mainly upon the practical experience of other gentlemen, who are more familiar with the walks of agriculture than myself.

The little I may say, however, I hope will contribute something to the great interests which you are now engaged in promoting.

Kinds of Wheat.—White and red chaff, bearded white, bald, Wabash, red-chaff, white Mediterranean, blue-stem, and several other varieties now on trial. Average yield per acre, 22 bushels; sown during the first weeks of September; harvested about the first in July. Fallow should be twice ploughed; ploughing should be from 5 to 8 inches deep. Yield increasing, as well as the mode of culture improving. Rotation in crops. Best remedy for the fly, good manure. Pasture fallow close, and sow after a sharp frost. Very little danger from weevil. Average price per bushel, 75 cents. Quantity raised in the county the past season, 600,000 bushels.

Corn.—Varieties obtained by mixing the large Southern corn with that of the North; and from the seed thus selected the yield is 35 bushels per acre. Cost of production, 15 cents per bushel. Best mode of culture: winter-ploughing, good manure, often stirring the soil, after planting, with cultivator and plough. It is fed both ground and whole. Too little attention is paid to manuring. Quantity raised in this county the past year, 700,000 to 800,000 bushels.

Oats, *Barley*, and *Rye* are largely cultivated. Yield per acre—oats, 30 bushels; barley, 30 bushels; rye, 25 bushels. Peas and beans are raised only for domestic use. Oats and spring barley are hard upon the soil; rye and fall barley least exhausting.

Clover and Grasses.—Season dry; average yield, 1 ton per acre. Best fertilizers, a light coat of stable manure, with a little lime or plaster. The mowing-land should not be pastured too short. Kinds used—clover and timothy on all lands dry enough to plough, and herdsgrass on wetter lands. Quantity of seed sown, 1 bushel to 8 or 10 acres.

Dairies.—Not carried on largely, as a business. Average quantity of butter per week, for each cow, is 4 pounds: cost, 10 cents per pound. Milk is generally placed in cellars or spring-houses, and skimmed while sweet—churned once or twice a week, in the dash or barrel churn. The butter should be set where it is not too dry to mould, nor too damp for the salt to evaporate and settle upon the surface. Average price of butter, 12 to 15 cents per lb., and that of cheese, 5 to 7 cents per lb.

Neat Cattle.—Cost of rearing till 3 years old, $10 to $15 per head. Average price, $12 to $35. Price of good dairy-cows, in the fall, $10 to $15, and in spring, $15 to $20. Price of cows for the blood or stock, $30 to $300. Twenty-five bushels of corn will produce 150 lbs. of beef. The largest quantity of beef will be produced from the least amount of food when fed to pure short-horned Durhams.

Wool-growing.—Profitable. Cost of growing per lb., 18 cents for coarse, and 28 cents for fine wool. One ton of hay for half the year, and the cost for pasturing the other half is equal to another ton, which will produce 20 lbs. of wool. With care, large sheep are best for mutton, and small sheep are more profitable for wool. Two-thirds of the ewes raise lambs, if well cared for.

Hogs.—The Irish grazier, Russia and English white crossed, China and small Berkshire, best for quick maturity. The cheapest method for producing pork is by feeding the hogs with ground grains in slop. With clover pasturage in summer, and apples in the fall, 10 bushels of corn will produce 100 to 130 lbs. of pork. Sugar-curing, with a little saltpetre; and when cured and smoked, take ground pepper and mix with good molasses, and

rub in well upon the soft or fleshy parts; then enclose it a canvas bag, and hang in a dry place.

Cotton, Sugar-cane, Rice, Hemp, Tobacco, and Roots.—Some of these are not raised at all—others very little. Turnips, carrots, and the French sugar-beet: a few experiments have been made with good success. Only for the scarcity of labor, and its high rate, experiments would oftener have been made. Potatoes grow well. They were cut short the past season by severe drought. Not more than 50 or 60 bushels to the acre were raised of either variety.

Fruit culture is attracting considerable attention, and is very much on the increase. The varieties are numerous, and of superior quality. Apples are better for hogs than for cattle. They contain too much acid for the latter. Potatoes, when boiled, and mixed with other food, are better for hogs than apples.

I am, very respectfully, your obedient servant,

J. HENDERSHOTT, P. M.

Urbana, Champaigne County, Ohio,
Black Creek Farm, December 26th, 1850.

Sir:—I will undertake to reply to a few of the questions contained in your Agricultural Circular, which I received some time since.

Wheat.—The most approved varieties of wheat are the Etrurian, reed-straw, and Kentucky smooth wheat, and the Mediterranean and old red-chaff, both bearded. There are also various other varieties grown. The average product of last harvest, I think, is about 20 bushels per acre. We prefer to plough but once for wheat, and then from 7 to 9 inches deep. We sow about the middle of September. I think the yield per acre is increasing. The last year's crop, I suppose, will average about 65 cents per bushel.

Corn.—The kind most extensively grown in this county is a large, yellow corn. The average product upon good land, well cultivated, I think, is about 50 bushels per acre.

Good meadows will yield about 2 tons of hay per acre. Timothy is the kind preferred.

Neat Cattle.—The cost of rearing till 3 years old, I think, is not less than $20 per head, and they are worth, at that age, about $25 each, if they are of good quality. The Durham cattle are preferred in this section of country.

Hogs.—The best breeds with which I am acquainted are the Byfield, Berkshire, Irish grazier, and the Calcutta; and I have learned, from actual experiment, that either of these breeds may be improved by crossing with another. I believe the cheapest method of raising pork is upon clover and corn; and I think that 100 lbs. of corn, fed to a thrifty hog, will make 25 lbs. of pork.

Among all the recent improvements in farming implements, I believe that the reaping and mowing machines will save the most labor. I have used, for the last 2 years, a mowing machine of Huzzy's patent, with some improvement by the manufacturers, (Messrs. Minturn and Allen,) with success and entire satisfaction.

Very respectfully yours,

SMITH MINTURN.

Greenwich, Cumberland County, New Jersey, 1850.

Sir:—In compliance with a request contained in your Agricultural Circular, I forward you some practical hints on the different crops which I cultivate.

Wheat.—Varieties sown, Mediterranean, and white, or blue-stem. My average crop is from 20 to 30 bushels per acre. I sow from the 10th of September to the middle of October. Quantity of seed per acre, 2 bushels. I plough 5 inches deep. The best preparation for a crop is a clover lea; second crop ploughed in by the middle of August, and the wheat should be well harrowed in, together with 200 pounds guano per acre, at the time of sowing the wheat. The best remedy for the fly is to pasture pretty close, early in the spring, with sheep. Average price, $1.10 per bushel.

Clover and Grasses.—Quantity per acre, 1½ tons. The best fertilizer is guano. Cost of growing, $5 per acre. Price in market is $10 per ton.

Hogs.—The best breed is the Berkshire. The best mode of raising is on clover pasture in summer, and corn-feeding in the fall. Ten bushels of corn, or 560 pounds, will make 100 pounds of pork.

Potatoes.—The best variety of Irish potatoes, for market, is the Mercer. Average yield, 150 bushels per acre. I plant in drills about 10 inches apart, with 2½ feet between the rows. I cut my seed, and plant in May. The best manure is barnyard manure, with 100 bushels oyster-shell lime per acre. Average price in our market, is 50 cents per bushel.

Manures.—That best adapted to our soil is vegetable manure and lime, which we consider the cheapest fertilizers we use. I have used guano very successfully, particularly on the wheat crop. The quantity I use is 200 pounds per acre, which will produce a good crop of wheat and grass before it is exhausted.

Yours, truly,

SAMUEL C. FITHIAN.

Fort Jessup, Louisiana, December 11th, 1850.

Sir:—I have recently had the honor and pleasure to receive your Agricultural Circular, and would now attempt a reply.

Corn.—The Spanish, or St. Antoine corn, I esteem far superior, in this climate, to any other. I have tried several different kinds, and, after eight years' experience with the St. Antoine, consider it the best. It grows much larger than any other variety, and is about two weeks longer in maturing than the gourd-seed varieties. It stands the severe droughts to which we are subject in this country much the best, and produces, on the same kind of soil, and with the same labor, from 25 per cent. to 33 per cent. more. The height to which it attains is from 16 to 18 feet. I send you a sample of it. It is what may be called a native of this country.

Cotton.—There has been so much said by men of high attainments and great experience upon this subject, that I fear to advance an opinion. I would say, however, with regard to bedding the land, which should be done the last of February, or first of March, I use a large shovel plough for opening the first furrow in the middle, then, with an old-fashioned coulter, run 2 or 3 furrows 8 or 10 inches deep in that before made, and fill up with

stalks of every kind which may be upon the ground; then, with turning-plough, finish the bed. Under this mode of treatment, the tap-root descends below the reach of drought, and the leaves will be green and the cotton growing when that on a hard foundation will turn yellow and drop its leaves. The quantity per acre we seldom estimate. I have raised the Sea Island cotton on our highest lands, where it produces nearly as well as the Petty Gulf, and of fine quality. I send you a sample both of the black and green seed. We have the prolific cluster variety, which is far superior to any other as to quantity per acre, and also for its picking qualities.

Sugar Cane.—We raise it here both on high and bottom land (provided it is rich) for our domestic use, but find it exhausts the soil more than any other crop. Our cultivation of it is limited.

Tobacco grows well here on any dry land. I have seen it growing and in blossom at Christmas. It is not raised here as a crop, though it might be to good advantage, if we were acquainted with the treatment of it.

Root Crops.—All kinds do well here.

Peas.—The cow pea is used for renovating the land, by turning under while green, and is considered the best variety. All kinds do well.

Cotton-seed, rotted, is the best manure we can use for our crops.

Meteorology.—I herewith send a sketch of a table from 1st June to the 10th of December.

Sheep and Wool.—The different breeds here are Merino, Saxon, and native. They are raised here without feed, either in winter or summer, except what they get in the pine woods. Their wool is very fine.

Respectfully,
G. W. THOMPSON.

Meteorological Table for Fort Jessup, Louisiana, latitude 31° 36′ *North; longitude* 16° 28′ *West. Elevation,* 1200 *feet.*

Months.	THERMOMETER.			BAROMETER.			Remarks.
	Highest Degree.	Lowest Degree.	Average.	Highest Inches.	Lowest Inches.	Average.	
June, 1850.....	82°	61°	73°	29.95	29.10	29.53	Rained on 16 days; winds N. and S.
July.....	85	71	76	29.70	28.90	29.35	Rained on 12 days; wind N.
August.....	89	68	77	29.70	28.95	29.29	Rained on 9 days; wind N.
September.....	88	62	74	29.90	28.90	29.41	Rained on 1 day; wind N.
October.....	83	44	67	30.35	29.10	29.67	Rained on 3 days; wind N.
November.....	75	50	61	30.38	29.20	29.91	Rained on 5 days; wind N. and W.
To 10th Dec.....	67	9	38	30·50	30.05	30.27	Rained on 2 days; cold, sleet, and snow 2 days.

Please accept this table as above, and find in this box a sample of the Spanish or St. Antoine corn. Also, of the black and green seed varieties of the Sea Island cotton. Also, a sample of the bolls of the prolific cluster cotton.

Respectfully,
G. W. THOMPSON.

Dunlapville, South Carolina, November 10th, 1850.

Sir:—In reply to your circular of the 26th of August, I will proceed to answer such points as come within my particular knowledge, in the order in which they are stated.

Wheat.—We have tried a great many varieties, but the kinds most generally in use are the big white, late, and the red spring wheat, early. The time of sowing big white, first of November; red spring wheat, all November. We sow late to avoid the Hessian-fly. But for the fly, either would do better sown early, say in September, for the late, and October for the early variety. Our late wheat is often damaged by the rust, for which we know no remedy, except early sowing. Preparation:—We soak in bluestone, 1 pound dissolved in water, for 5 or 6 bushels of wheat, to prevent smut, which it does effectually. Sow from 3 pecks to a bushel to the acre, after corn or cotton. We generally plough but once, about 3 inches deep; two ploughings are said to do better. Yield per acre, about 8 bushels; when manured with compost or cotton-seed, it is increased to 15 or 20 bushels. A day's sunning in hot weather is our remedy for the weevil. Average price about $1 per bushel. Owing to the cheapness of land here, the small quantity of seed sown, and the little cost of labor in our mode of putting in, we can grow wheat as cheaply, perhaps, as in any part of the United States. But cotton engrosses our attention, and but little more than will supply our inland towns is sold. Our time of harvest is from the 1st to 15th of June.

Corn.—The most esteemed varieties are the gourd-seed, or between that and flint; the Oregon succeeds well. We have all the shades of white, yellow, red, speckled, &c. The small Northern varieties do not answer so well here; they come in two or three weeks earlier than the Southern corn. Average product per acre, on upland, is 15 or 20 bushels, and on bottoms or lowlands it is 40 or 50 bushels.

By high manuring and good culture, these products can be greatly exceeded. Cost of production per bushel varies under different circumstances, say 33 cents. The best system of culture:—Planters have different methods: I prefer the following. Plant on wheat or oat stubble; break up deep and thoroughly, early in the winter, the earlier the better. About the middle of March lay off furrows with a shovel plough, about 5 feet apart, taking care to run them as nearly straight as may be, throughout the whole field. In these furrows drop 2 or 3 grains every 3 feet, to be thinned to one stalk, when secure from birds, &c. If manure or cotton seed is to go in, drop it on one or both sides, close to these grains; cover lightly with one shovel or two small scooter furrows, or with a harrow. When it is fairly up, run round with a scooter or small cultivator, and follow with the hoe a few days after, taking care to kill all the weeds and grass on the ridge, and earth the corn lightly. This operation should be finished by the first of May, when the cotton will call for our attention. Some 15 days afterwards give the corn a deep, close ploughing, and at intervals of about 20 days two more ploughings, both of which should be more shallow, especially the last. It is now supposed to be "laid by," unless the ridges are foul, in which case they must be cleaned with the hoe. This is our principal cereal crop, forming two-thirds or three-fourths of the bread eaten by our people, and the principal food of our horses, mules, and hogs. Enough is generally

raised for the home supply, and little or none is sent to a distant market. For feeding to our stock, it is rarely ground or cooked, except in years of scarcity. The common opinion is, that it will go farther when ground or cooked.

Oats are more extensively cultivated than any other small grain. Average yield per acre, 10 to 20 bushels.

Barley and *Rye* are but little sown, except for grazing-lots and pasture

Beans are only raised for the table.

Peas are cultivated for the double purpose of pasturing our stock in the fall and early part of winter, and for renovating our lands. For this last purpose they are estimated by many very highly; so much so, that they have been called the clover of the South. Whether they are more valuable than the same amount of other vegetable matter, I have never been able to determine: true, the authority in favor of the opinion is very respectable. They are generally drilled in between the corn rows at the second or last ploughing.

Clover and *grasses* receive too little attention. Our summers, I think, are too dry and hot for them. With high manuring and seasonable rains, I have seen fine lots of clover. We depend upon the native grasses.

Neat cattle are raised for the home supply of beef, milk, and butter; but little is sent to a distant market. The smaller breeds are thought to suit our short pastures best.

Sheep and Wool.—Almost every farmer has a small flock of sheep, to supply wool for winter clothing. For any other purpose they are not raised, but the opinion begins to prevail that wool-growing might be as profitably conducted here as anywhere else.

Hogs.—The best breed is a mixture of the Berkshire and our native stock. The best method of raising:—Feed with corn except when they have the run of the harvest and pea-fields. One hundred pounds of corn will yield about 25 pounds of meat; if cooked, perhaps more.

Cotton.—This is the great crop of the region. Upon it the planter mainly depends for his moneyed profits. It gives character to, or marks with its impress, every system of culture adopted here. No other crop can be permanently introduced, that intrudes upon or displaces this. It throws every other into the background. No other attains to that perfection among us which it otherwise might do. As now generally managed, it is unfavorable to any system for improving our lands. Indeed, many of our farmers aim at nothing else than to crop with cotton until they run down their land, and then throw it out. Such a practice is becoming less and less common, and must soon cease from necessity. There is no doubt that a rotation might be adopted which would preserve and even improve our lands. There is no more cleansing crop than cotton, nor none after which other crops succeed so well; none, therefore, can better be made the basis of a good rotation. I have adopted the following, with great benefit to the soil, viz. 1st, cotton, manured with compost in the drills; 2d, cotton; 3d, oats or wheat; then cotton, manured as before, &c.; resting once in 8 or 10 years. But no doubt a better system, when the fields lie sufficiently near the stables and cattle-yard, is that of Dr. Cloud, of Alabama. His course is, 1st, cotton; 2d, corn; 3d, small grain, and so on continuously. He manures every cotton crop with compost, both broadcast and in the hill. The product, he reports, almost exceeds belief. (For a full account, see the back volumes of the Albany Cultivator; also, I believe, the Southern Cultivator.) It is evident,

then, that an improving rotation can be adopted, but further experiments must decide what it shall be. Perhaps no one course will suit every locality and every condition. Average yield of clear cotton per acre, 200 pounds, and of ginned cotton-extremes, 100 to 600 pounds. (I should have said before, that my remarks are intended to apply only to the granitic region of South Carolina.) Cost of production, per pound, 6 to 8 cents: it varies greatly. Best preventives against rust, army and boll worms:—Except in newly cleared lands, the rust does not often appear, and the army and boll worms rarely visit us. The cotton-louse is more troublesome than either. I know of no certain remedy. The best, I presume, is not to repeat cotton too often, successively, on the same land; thus starving out these insects for want of proper food. Owing to our comparative exemption from these plagues, notwithstanding our soils and climate do not suit cotton as well as in the South-west, our crops are more uniform and certain. Cold springs, too much wet, and drought are the evils we most dread.

"Your experience with cotton-seed as a fertilizer."—It is excellent for every crop to which I have seen it applied, as we would infer from their analysis. They are as valuable in the garden as in the field. I know of no exception. The greater part of mine are scattered over the wheat and oat crop, at the rate of 20 or 30 bushels to the acre, but sometimes they are applied to the corn and cotton also; but I have found it difficult to get a stand of the last, owing to its dying out. For potatoes and beets, nothing can excel them.

Potatoes.—Irish potatoes highly manured and planted early, say in February, if the spring is wet or seasonable, succeed very well—coming in for table use often in May. If planted later, they are more uncertain. I have never heard of the potato disease in this region. Sweet potatoes, on sandy soils, succeed admirably. We are too far from market to raise them for any other than home use.

Manures.—A greatly increased attention is beginning to be bestowed upon the making and applying compost manures. We are too far from the seaboard to import fertilizers. Lime is to be had only in two or three localities. I know of no instance of its having been extensively spread over the land. Whether it would do good on our soil remains an open question. I have thus touched imperfectly on some of the points in your Agricultural Circular. As I have been able to communicate nothing new, I fear I have been tedious. If any part of this communication will serve your purpose, it is freely submitted to your disposal.

Very respectfully yours,
JOHN H. DAVIS.

Magnolia, Putnam County, Illinois, December 10th, 1850.

Sir:—Your circular of the 26th of August was duly received, in answer to which are subjoined the following impressions upon certain agricultural branches in this portion of our State. Having had very little practical experience in these matters, should I depart from practical observers in some of my estimates, it will be only a matter of conscientious opinion, not presumed to be entirely correct, and therefore will not alter the fact.

Our State occupies a space between 37° and 42½° north latitude, and here, near the 41st, we have a beautiful prairie country, subject to all the

varieties and changes of season peculiar to the same latitude in States lying east of this, and with a fertility of soil unsurpassed by any other State in the Union. Perhaps not more than one-tenth part of our land in its native condition is found covered with wood, and this generally borders on the rivers and small streams. From this circumstance, you will readily perceive that the first settlement of such a country will take place at or near the junction of prairie and timber, thence generally extending into the prairies, the central portions of which, in our State, will, at no very distant period, be teeming with the rich productions of a wealthy agricultural community. The abundance of mineral coal found to be so generally diffused will supply the place of fuel. Then, again, the practicability of growing different kinds of wood in a few years, to supply the natural deficiency, and likewise a reference to that branch of agricultural interest which so naturally suggests itself in the interior of an extensive prairie—the production of hedges, which later enterprise, under the investigations of Professor Turner, of Jacksonville, Illinois, seems very flattering, even beyond our former most favorable anticipations in making a living fence. The kind which he prefers, and in which he has every confidence, is the Osage orange, and if its permanence or ability to endure the severity of our latitude, becomes established beyond a doubt, all difficulties in fencing will disappear, as I have been informed that a good hedge of this material can be grown at an expense of 25 cents per rod. However, should this article fail to sustain the reputation which it has already obtained, we have several varieties of the common thorn, of spontaneous production, some of which, I have no doubt, may be converted profitably to hedging purposes. The above advantages being so confidently available, seems to justify the opinion that it will be but a few years when the prairies in Illinois will be densely settled.

The cultivated proportion of our country is yet relatively but fractional, and the fertility of the soil has enabled the farmer to procure abundant crops by a very easy mode of farming. Many early settlers have cultivated the lands for the last 20 years, and still obtain very good crops, without ever having manured them—say from 50 to 80 bushels of corn to the acre. The largest amount above specified is procured from bottom land, and the least from the table or prairie land, at a cost of about 15 cents per bushel, and has been selling at from 25 to 45 cents per bushel during the past season.

The production of wheat on new land as a first crop, after breaking up the prairie in May or June, then sowing in August, 1½ bushel per acre, is the most common rule adopted by farmers; and in this way they generally succeed in getting good crops of from 20 to 30 bushels to the acre. The above I refer to as being the most successful mode, although very good crops are frequently obtained from old lands with but quite indifferent cultivation. I have no doubt our old lands will yield most abundant crops of wheat with a good system of agricultural preparation—as much, perhaps, to the acre as when first broken. Very little exertion has yet been made to increase the natural fertility of our prairie lands—seeming rather to question the propriety of urging the old dame, already so profuse.

Those machines of modern invention, constructed for cutting grass and grain by horse-power, are regarded as truly labor-saving inventions, and will enable our farmers to engage more extensively in the grass and grain-growing business. From actual observation, I should speak in high commendation of their utility. Two hands and 4 horses can cut, in a very neat

and saving manner, from 12 to 20 acres a day with one of these machines, and with them, under their present degree of perfection, we are enabled to cut and save one-third more than under former modes of harvesting. And yet I apprehend that the genius of invention will still simplify, improve, and render them even more desirable.

The cultivation of fruit is receiving increased attention, with no risk of overrating its true importance. This is not saying too much, when from one who believes that half the value of life is lost in the absence of the finer varieties of fruit, so far, at least, as luxurious eating constitutes the value of life. Our nursery-men seem to be striving to excel in the production of thrifty, healthy trees, with the accomplishment of which they express themselves most highly gratified.

The wool-growing business, under existing circumstances of our country, is regarded as not particularly profitable, other investments of industrial capital producing better compensation. Those gentlemen who have entertained a favorable opinion, and who are engaged in this business, have generally driven in good flocks from the East; but have had the misfortune to lose largely of their numbers during the first and second years, either by injury sustained from driving, or otherwise by acclimation. It is, however, proper to say that those raised here are healthy and large, even above the size of those generally raised in other portions of our country, with like care and attention. I am not able to determine the expense of rearing cattle until they are 3 years old. I am well assured that a succession of mild winters will produce very essential differences in the true expense of rearing. Some winters are so mild that cattle have wintered very well without foddering, by having their range in corn ground and timothy meadows. Other seasons, much more unfavorable, require a period of foddering of from 3 to 5 months. A very common price for wintering 2 and 3 years old cattle is from $2 to $2½ per head, and, under the present condition of the settlement of the country, the summer range costs but very little, except the expense of salting and keeping them within a range of observation, just to prevent their straying; and, with access to this wide range, extremely fine beef is produced, better than I have ever seen grown upon pastures of tame grass.

I have the honor to remain, very respectfully yours, &c.,

J. B. ASHLEY, M. D.

Hamptonburgh, Orange County, N. Y., December 26th, 1850.

Sir:—In reply to your circular of the 26th of August, I will briefly mention a few things pertaining to agriculture, of which I have some practical knowledge; and first of *Wheat*. This most valuable product is with us a rather uncertain crop. There are several varieties in use, but the one known as the Mediterranean is most esteemed. If sown early, say from the 1st to the 15th September, it generally escapes the attacks of the fly and weevil, or worm, in the head. We usually sow wheat after oats, and many of our best farmers prefer once ploughing to more. Our rotation of crops is corn on sward land, well manured, succeeded by oats, and then wheat or rye. The average yield of wheat in this county may be set down at 12, or possibly 15 bushels per acre, occasionally going as high as 35 bushels. The average price of wheat for the last five years has been about $1.20 per bushel.

Corn.—This with us is a much more important and certain crop than wheat. The kinds usually planted are the 8 and 12-rowed white and yellow, which ripen early. We usually plant from the 10th of May to the 1st of June, and generally harvest or cut up at the root as early as the 10th September, and place it in shocks, and let it remain till we husk it in October. The average yield per acre is about 50 bushels, though some of our premium crops have exceeded 100 bushels. The cost of culture I am unable to state, but on rich soil the stalks will nearly pay the expense. They make a most valuable food for milch-cows; the milk and butter being of the richest kind and of the finest flavor. Corn is mostly fed whole, but I think it would be much more profitable if ground and cooked for hogs. We usually grind the ear for cattle, and feed raw. Price from 50 to 63 cents per bushel.

Oats we consider a good crop, and sow mostly after corn. Yield per acre, from 30 to 70 bushels. Seed sown, 2 to 2½ bushels. Price, 30 to 45 cents per bushel of 32 lbs.

Rye is sown after oats, from 1st September to 10th October. Seed sown, 1½ bushels per acre. Average yield, 15 bushels per acre. Price, 60 cents.

Clover and Grasses.—In this section, the two most esteemed grasses are clover and timothy; the latter sown in the fall, with wheat or rye, at the rate of 4 to 8 quarts per acre, and the clover is sown in the spring, about 6 lbs. per acre. Yield from 1½ to 2½ tons per acre.

Dairy Husbandry.—Since the construction of the New York and Erie Railroad through this county, large quantities of milk are sent to New York, though those only who live near the line of the road can avail themselves of this source of profit; so butter is the main dependence of the dairyman. The annual yield per cow is from 150 to 200 lbs. I know of one or two small dairies, of 10 or 12 cows, where the average is 240 lbs. The average price of butter with us is from 18 to 21 cents per lb. In this county we churn the milk, using large churns, which hold one or two barrels. We use horse, sheep, or dog-power, and water-power where we can. In large dairies the horse is preferred, but in very many a sheep will perform all the labor, and fatten, while churning the milk of 15 or 20 cows. Being convenient to the New York market, our butter is sent off weekly, as a general thing, in tubs of from 13 to 50 lbs., though many pack down in large firkins, and keep till fall. A very important item in the profits of the dairy is the pork made on the buttermilk, averaging, say $4 the cow; also the calves, which are sold, at four weeks old, at $3.50 to $5 each. Some of our most successful farmers will make their cows pay, from all sources, from $40 to $52 per head.

Neat Cattle.—Very few are raised in this county. Good dairy-cows are worth, in the fall, from $18 to $25, and, in spring, from $25 to $35.

Sheep and Wool.—Our lands bear too high a price to make the growing of wool a principal business: still there are many sheep kept. The coarse-woolled are generally preferred for mutton and lambs. As a general thing, the lambs will equal the number of ewes annually. I could name a farmer who last year kept 50 ewes, which cost $1.75 each, and raised 71 lambs, which sold at $2.25 each per head. The ewes averaged 3 lbs. wool, worth 28 cents per lb., and they were worth this fall, $2.50 each.

Hogs.—The cheapest, and of course the most profitable method of producing pork is on the buttermilk of the dairy, and corn-meal cooked, upon which they thrive rapidly, and make the best kind of pork.

Potatoes.—This crop proved almost an entire failure the past season, scarcely enough having been saved for family use. The average yield formerly was 200 to 300 bushels per acre.

Very respectfully yours,

W. W. JACKSON.

Wheeler, Steuben County, New York, December, 1850.

Sir:—Your Agricultural Circular has been received, and, in reply, I will transmit such information as I have been able to obtain. This county contains about 1000 square miles, situated in lat. 42° 36′ N. Its principal products are, wheat, corn, oats, barley, wool, &c. The land is well adapted to all kinds of farming common in this part of the State, and our agricultural interests are receiving increased attention.

Wheat.—Our wheat crops are generally good on the high lands, and in lower situations it is subject to rust. We are somewhat troubled with the Hessian-fly, but not with weevil so far as my knowledge extends. The best means of avoiding the ravages of the former is to sow late. In some sections of the county, wheat has been much injured by the wireworm, which can generally be exterminated by cultivating the land for several years. Varieties of wheat, Hutchinson, Soules, white flint, blue-stem, and the red-chaff. The Hutchinson variety is not so highly esteemed as formerly, on account of its liability to shell so soon as ripe. The Soule variety is liable to the same objection. Both are early, and should be cut before fully ripe. The white flint is an excellent variety, for the reason that it will not shell if it stands several days after it is fit to cut. The Ohio flint is much esteemed by some, because it will admit of being sown later than any other variety that I am acquainted with. Our crop, last season, was probably an average one, though the quality is not so good, owing to the wet weather at the time of harvest, which caused much wheat to grow in the straw. Average yield, 12 to 18 bushels per acre. Time of seeding, from 1st September to 1st October. Harvest, about 20th July. Quantity of seed per acre, from 1 to 2 bushels, though, according to my experience, 1¼ bushel is enough. After sowing, we sometimes use the cultivator to cover the grain, which, by the way, is one of the best modes of putting in wheat. I consider the cultivator next to the plough in point of utility. The yield per acre is generally on the increase. Preparation of seed:—Some soak in brine, and others in vitriol-water, and dry with lime; though, perhaps, the majority sow without any preparation. One of the best preventives against smut is to soak the seed in lime-water from 24 to 36 hours, and dry with fine lime in order to sow. Wheat prepared in this way always looks strong and healthy when it comes up, and, I think, pays well for the trouble. Two seed-drills were last fall introduced into this county, and were used only to a small extent. I used one of them to put in about 20 acres of wheat, and think that, where the land is not rough, these machines will prove very valuable to the farmer. By using them there is quite a saving of seed. Price of wheat, last fall, $1 per bushel. Spring wheat is grown here to some extent, though not much where we can raise good winter wheat.

Corn.—This important crop proved to be unusually good the past season, notwithstanding the cold and wet weather at the time of planting. Varieties, the large and small 8-rowed yellow, the 8-rowed white, also 10 and 12-rowed yellow. Each variety has its patrons. After an experience of 40

years in growing corn, I consider the 8-rowed white to be the best variety I have ever tried, though it may not look quite so rich. Average yield per acre, about 40 bushels. The cost of production depends much upon location and soil; for some land can be cultivated much cheaper than other. The average, however, may be set down at 31 cents per bushel, exclusive of interest on land. My method of cultivating corn is to spread upon sward land a good coat, of manure, and plough in as deep as the strength of the team will admit of; harrow thoroughly, and mark off the rows 3½ feet distant each way. I use the cultivator to work among my corn, running it both ways at each time of hoeing. I think it pays well to grind all grain the farmer may wish to feed out to his stock. As to cooking, I do not know, but presume it would be a good plan.

Oats are extensively cultivated in some parts of this county, where wheat is liable to be winter-killed. Average yield, about 40 or 50 bushels per acre; price per bushel, 37 to 40 cents. It is thought to be a more exhausting crop than any other. Quantity sown per acre, about 3 bushels.

Barley.—More sown the past season than usual. The 2-rowed variety is now preferred on many accounts. It weighs more, has less beard, consequently pleasanter to handle; also a longer and stronger straw, so that we can cradle it and bind it in bundles. Price, the past season, about 70 cents per bushel. Seed, per acre, from 2 to 3 bushels.

Rye not much raised. Beans raised only in small quantities. Peas are grown somewhat extensively in sections where corn does not succeed well. The value of peas for making pork is nearly equal to that of corn. Average yield per acre, about 30 bushels. I have no knowledge of their being sown as a renovating crop. Quantity sown per acre, 3 to 4 bushels. Buckwheat is grown to some extent. Yield per acre, about 20 bushels. Quantity of seed, ½ to ¾ bushel. I am inclined to believe that barley, peas, and buckwheat are the least exhausting crops.

Clover and Grasses.—The hay crop is a good one with us. Average yield per acre, 1½ to 2 tons. Plaster is the best fertilizer for meadows. I sow about 4 quarts each of clover and timothy for meadows, and, for pasture, rather more clover. The cost of growing hay depends so much upon circumstances, that I am not able to estimate it.

Dairy Husbandry.—There is considerable attention paid to this branch of industry, though I am unable to enter into particulars on the subject. The price of butter is from 12 to 15 cents; and that of cheese, 6½. Those who have large dairies use horse-power for churning, and the smaller ones, dog-power.

Neat Cattle.—The cost of rearing till 3 years old is more than they will sell for; usual price at that age, from $16 to $24. Good dairy-cows are worth from $20 to $30 in spring, and in fall from $15 to $20. The only advantage to farmers generally in rearing neat cattle is, that they can use their coarse fodder in this way that would otherwise be lost. More attention is paid to improving the breed of cattle than formerly, though not so much as in the neighboring counties.

Sheep and Wool.—Most wool-growers do not think it a profitable business at the present prices; but as they have arranged matters expressly for that purpose, they continue it, hoping for better prices. I have conversed with a number of those engaged in the business of wool-growing, relative to its cost per pound; and all agree that it cost 40 cents. We are of the opinion also, that it costs as much to gr w coarse wool as fine, though, if

we had a good market for mutton, it might be preferable to grow coarse wool, as these varieties have larger carcasses. Nine-tenths of all the wool grown in this county is what may be termed fine wool, and, according to the testimony of wool-buyers, is of superior quality. Average yield per head, about 3 lbs. The average consumption of hay per head, during the winter, is about 300 lbs. The proportion of lambs annually reared to that of ewes, is as 7 to 10.

Hogs.—The Berkshire were formerly much esteemed; but we have another breed, which I cannot designate by any particular name, more popular than any other. They are of a red or sandy colour; no bristles, but fine hair, and small bones, and will fatten at any age. The pigs, (if pure blood,) when about two weeks old, will shed their tails. Cannot say how much meat 100 pounds of corn will make.

Sugar.—There are considerable quantities of maple-sugar made in this county.

Root culture is on the increase. Carrots are excellent to feed to horses and cattle, and grow best on light, sandy soil.

Potatoes have, during the past season, suffered much from rot. Many pieces were not worth digging. I planted 18 different kinds, all of which (except the "Mountain Junes") were more or less affected with rot: these were not. They are very early, and are fine for the table, and yield very well. Know of no remedy for the potato disease.

Fruit culture is receiving increased attention. We have many excellent varieties of apples, pears, peaches, plums, cherries, and grapes. Peaches do not flourish well but in a few localities. Apples are thought to be worth as much for feeding to hogs and cattle as potatoes.

Manures.—There is not as much attention paid to this subject as there should be. Some farmers heap up their manure in spring and let it remain till fall. I have no knowledge of plaster or lime having been used with manure as a compost. No guano used here to my knowledge.

Respectfully yours, &c.

O. F. MARSHALL.

Hancock, N. H., December 20th, 1850.

Sir:—It is believed that a very considerable portion of the agricultural statistics contained in former reports from the Patent Office, may be far beyond the common average products. This may be accounted for on the ground that none but the most favorable are furnished. Concerning the products of the dairy, there are but few accounts that may not be considered as very extraordinary. Having kept an accurate account with our small dairy the past season, we have thought that it might not be amiss to forward to you the result. On a farm of about 100 acres, divided as usual into mowing, tillage, pasture, and woodland, we have kept 4 cows of the native breed, from which 4 calves have been reared, principally on skimmed milk, and 268 lbs. of butter have been made, from May to November inclusive. This is but 67 lbs. to each cow, and is probably not far short of the ordinary quantity made from cows generally in this section.

Respectfully, yours,

REED CUMMINGS.

Keene, Cheshire County, New Hampshire, January 13th, 1851.

Sir:—Please receive what follows as an answer to your circular of the 26th August, 1850.

Wheat.—None raised in this town, and but little in the county.

Corn.—There are two varieties much used here, though, perhaps, not extensively known—one of which, if not both, originated in Canada. The kind referred to has short ears, eight rows, and is very compact on the cob. It grows larger from year to year, and may, in time, become less valuable. It is thought to be the best variety for flat land. It has yielded, with good culture, 75 bushels to the acre. The other variety has 12 rows; the kernel long and slim, the yield good, and is best adapted to hills which are not exposed to early and late frosts. I do not know how it is at the South, but here the varieties of corn are numerous and evanescent. In my opinion, they originate in the peculiarities of soil, cultivation, and locality, and disappear when not fostered under these peculiarities. Average product, in Keene, 40 bushels; in the county, 30 bushels. Time of seeding, about the 20th of May; and harvesting takes place in October. An intelligent, aged, and successful farmer has given me the following account of his mode of raising corn, its cost, product, &c. He ploughs his land (always sward) in the spring, about 7 inches deep, turning it well over, then harrows and furrows it. He then puts on 20 cart-loads of dung to the acre, all into the hills. The dung used, say in 1850, was made in the winter of 1848–49, remained in the yard during the summer of 1849, was hauled into the field in the fall, placed in large heaps, and shovelled over once or twice during the next spring. He uses great care in covering the corn and dung; hoes the corn twice, and harvests in October. He is never troubled with the wireworm, and attributes his exemption to planting on sward land.

The cost he estimates as follows:

Ploughing, per acre		$2.00
Harrowing "		75
Furrowing "		25
Twenty loads of dung		20.00
Putting dung in hills		2.00
Planting corn		1.00
Hoeing corn twice		4.00
Cutting up corn		1.00
Husking corn		4.00
Harvesting corn		1.00
Total		$36.00
Corn fodder	$10.00	
Manure left in soil	10.00	20.00 deduct.
Net cost		$16.00
Product, 75 bushels, at 70 cents		52.50
Income per acre		$36.50

The above product was unusual, but was obtained in the year he had in view. The next spring, he spread upon one acre 15 loads of dung, and sowed oats and grass-seed, and the product was more than 90 bushels of oats. He sowed 10 qts. of timothy, and 5 or 6 lbs. of clover-seed. This is his usual quantity. He keeps his land in tillage two years, and in grass

from four to six; and on the whole of his grass land (about 70 acres) he averages one ton, or more, of hay per acre.

Dairy.—The above-mentioned farmer keeps 6 cows, and has kept the same cows for 12 years past. For the last 10 years, he has made 100 lbs. of butter and 100 lbs. cheese, annually, to each cow. He has generally reared 10 calves each year.

Neat Cattle.—The extreme prices, at 3 years old, are $15 and $30; the average price for the county, $23.

Hogs.—The Suffolk breed is considered the best. An intelligent farmer, who speaks from his account-book, says that a bushel of corn will make 15 pounds of pork, and that his pork costs 5¾ cents per pound. The most approved practice of feeding hogs here is to feed with potatoes and cornmeal, boiling the potatoes, and, while hot, mix in the meal. Such food, whether for hogs or cattle, is much more valuable for being cooked. To bake bread for horses would not be without precedent.

Respectfully yours,

S. HALE.

Hudson, Lenawee County, Michigan, January 6th, 1851.

Sir:—I have taken considerable pains to inform myself, both by observation and inquiry, on the subject of agriculture, and I think you may put implicit confidence in my statements, as I have not only advanced my own opinions, formed from experience and observation, but have compared them with the concurring judgment of the best farmers in this part of the country. This county is blessed with every description of soil, and all of the most fertile character; so that our remotest backwoods can boast of as fine farms as any part of the West. Agriculture is yet in its infancy, comparatively, but much interest is taken in its improvement; also in an annual fair. The prospect of an agricultural work, of real merit, is hailed with unfeigned pleasure.

Our staple product is wheat, of which too much is grown for the good of the soil and the best economy of the farmer—a fact which many begin to appreciate. The most common varieties are white, as they do as well as any other, and bring a higher price. Soules, Hutchinson, and white-flint are the most esteemed. Some of the red-chaff bald is raised, and some Mediterranean. In Monroe, the red varieties only are raised, on account of the ill success of the white. The average product, this year, is about 20 bushels per acre. The yield appears to be rather on the increase, owing, probably, to the improvements in culture. Time of seeding, from the 1st to the 20th of September. The most of it is done during the first and second weeks. Harvest commences about the 1st of July. There seems to be but little necessity for any preparation of seed, as we are almost entirely free from smut, weevil, and fly. Our best system of farming is winter fallowing, with some early spring crop as a renovator; though, perhaps, the most common is the summer fallow, with two or three ploughings of about 6 inches deep. One and a half bushel of seed is generally used to the acre. The average price is 75 cents per bushel.

Our next most important crop is corn, of which the large, eight-rowed yellow, the red-cob, and dent are the most esteemed varieties. The average product is 40 bushels per acre. Cost of production, taken from several

careful estimates, by different men, is 17 cents per bushel. The best method of feeding is, certainly, in the form of meal, cooked and mixed with something less hearty, such as apples and potatoes. Time of planting, from the 1st to the 20th of May.

Oats are much cultivated here. Yield per acre, about 35 bushels; quantity of seed sown, from $2\frac{1}{2}$ to 4 bushels per acre.

Rye, Peas, and Barley.—But little raised.

Beans are grown to some extent, and are thought to be a profitable crop. Average product, not known. These latter crops are sometimes planted to good advantage as renovators.

Grasses.—The small red clover, timothy, and red-top are the varieties raised here. Average product, about 1 to $1\frac{1}{4}$ ton per acre. Timothy and red-top are used on the low lands, and clover on the high lands. The large red clover is used as a fertilizer.

Dairy Husbandry.—This is a profitable branch of farming. The product of 4 cows, during the past 10 months, has been the rearing of 4 fine calves, nearly 600 pounds of butter, and 200 pounds of cheese, which may be taken as about the average. Butter is worth 10 cents, and cheese 6 cents per pound.

Neat Cattle.—Some of the foreign breeds seem better adapted to the climate than the native.

Wool-growing is becoming better understood than formerly, and meets with better success. The coarse-woolled sheep are gradually going out of use, and the fine-woolled are supplying their place, as it costs no more to raise them.

The rearing of hogs has received some attention, but I have had no opportunity, as yet, to ascertain which are the best breeds. I believe Byfield and Leicester to be among them.

The only root crop raised, to any extent, is potatoes. Product, about 200 bushels per acre.

Fruit culture is rapidly increasing, and no doubt is entertained as regards the comparative value of this crop above all others. All our fruits thrive well, and none of the diseases mentioned are known.

I have had neither time nor opportunity to observe the indications of the thermometer, but shall keep an accurate account of its range during the coming year; also of other meteorological observations which may be convenient.

If these remarks meet with your approbation, I hope, in future, to be able to communicate something of more value.

GEORGE W. BOWLSBY.

P. S.—Please forward your Patent Office Reports to this place. Any seeds which may be for distribution I shall receive with extreme pleasure. I shall send a new variety of wheat, which seems about to supersede all others in this section, as soon as I can obtain a pure article.

G. W. B.

Union Mills, Carroll County, Maryland, December 23d, 1850.

Sir:—Your circular has been duly received, and I have hesitated whether I should reply or not, because of my limited information upon the subject, and want of practical knowledge in farming operations. I have concluded, however, to state what has come within my observation, and you are at liberty to make what use of it you may think proper.

The section of the county in which I reside has mostly a thin and barren soil, and in many parts gone to waste from neglect and a want of means to renovate it, though in many other instances (and such cases are increasing) farms of the same nature of soil present quite a different appearance, owing chiefly to the use of lime and careful tillage, which have so changed the nature and productiveness of the soil as to show plainly that some powerful agent has been used. You will find then, upon those farms which are in a more flourishing condition, that lime has been used with more or less advantage, according to the care and skill of the farmer. There are many farms in this section that, fifteen or twenty years ago, might have been bought at from five to ten dollars per acre, which would now readily command thirty to forty dollars per acre, and some even higher than this. This difference arises in a great degree from the improvements that have been made upon them, and will without doubt be still further improved, when they may with propriety be classed with some of the better limestone lands as to value; for it is generally admitted that the grain produced upon this soil is of the best quality, and superior to that which is raised upon limestone land, which is naturally of a better quality. Farming in our section has not been reduced to any thing like system. Industry and close application, with the use of lime, have effected more than science: how far this may aid is yet to be tested. No doubt *it* will also much advance the interest of the husbandman when properly directed. It is, therefore, for the want of proper care, that lime has been and still is used without any definite quantity per acre, or particular time for application. In fact, it is not considered of so much importance as it once was. The quantity varies from 40 to 100 bushels per acre. Mostly applied in the spring to corn ground. It is supposed to continue its virtue according to the quantity used, which may be set down at from five to ten years. The cost is from 10 to 15 cents per bushel on the ground: this difference of cost arises from the difference in the distance of transportation. The first cost may be set down at 8 cents per bushel. It is carried, at most, some eight to ten miles. One gentleman in our neighborhood, who occupies as thin land as any in the county, has been in the habit for some years past of housing his stable and other manure. I have not heard his opinion as to whether he derives essential benefit from this practice or not; but the appearance of his farm and his success in raising crops would seem to indicate and justify an impression in favor of this mode of preserving manure.

I have thus made a few general remarks relative to our section of the county. I may probably be able at another time to give some more satisfactory information; but as it is my impression that none should be given unless it can be relied upon, I forbear saying any thing more at this time, as any thing short of this is calculated to defeat the great object of your Report.

I am, very respectfully, &c.

A. K. SHRIVER.

Franklin, Warren County, Ohio, December 21st, 1850.

Sir:—In attempting to answer some of your agricultural queries applicable to this region, where the soil of almost every farm differs from the neighboring one, consequently requiring different modes of culture, I can only give approximate answers. The variety of wheat principally sown for some years past is the Mediterranean, a red wheat of inferior quality, but ripening earlier than most other varieties, and not so liable to rust—therefore a surer crop. I procured seed of the improved white flint from Ira Cook, of Byron, New York, some years ago, and have sown of it each year since, as have some of my neighbors. Though a very excellent variety, yet, in consequence of its late ripening, it is liable to fail from rust. The only preparation we give our seed is to free it from chess and cockle. A large majority of our farmers plough but once; the usual depth is four to eight inches. We sow from one and a half to two bushels per acre, and harrow in, though a few cover their seed with a small plough; the result is about the same either way, if well put in. The time of sowing is from the last of August to the first of October, though the greater part is sown between the 5th and 15th of September. Our harvest commences the last week in June, or the first of July. The yield varies according to the season and culture, from 5 to 35 bushels per acre. The usual average is about 18 bushels, and has been for the last fifteen years. Not often troubled with fly or weevil. Average price for the year, 87 cents.

The varieties of corn are as numerous as those of the soil we cultivate, but generally known by sectional names, as Honey Creek, Keever, bullskin, &c. Average crop for upland, 40, and for bottom lands, 60 bushels per acre. I can raise the best crop by ploughing deep (say ten inches) and thoroughly before planting, plant in squares, four feet each way, and work with the harrow and cultivator till the corn is knee high; then plough to the rows once with a small plough, and lay by with the cultivator. So long as the price for farm hands is so high, ($220 a year each,) the difference in product will not justify grinding or cooking grain for feeding stock, without an increase in the price of grain and meat. Broom-corn is becoming a crop of considerable importance in this vicinity, large quantities being raised annually for shipment, and still more that is worked into brooms at home. The usual method of growing it is to plant in drills three feet apart, and cultivate the same as Indian corn. Product from 600 to 800 lbs. of clean brush per acre, worth from $90 to $100 per ton; besides from 20 to 40 bushels of seed, which makes a good feed for hogs. I cannot state the increase of grain by feeding hogs on the ground, but I know many fields which have been planted in corn for twenty years successively, without any diminution of crop by turning on hogs to feed off the crop in the fall. The cost of raising Indian corn is about 9 cents per bushel, exclusive of land rent. Average price, the last year, 31 cents.

Oats turn out about 40 bushels per acre, average price 28 cents.

Timothy meadows yield from one and a half to two tons per acre. Grass-seed sown on wheat land immediately after the harrow, use some 10 lbs. of timothy, and 6 of clover. I save about a pound of seed per acre, by sowing it with a machine of my own construction, with which I can sow eighteen acres a day, perfectly even on the ground.

But little attention is paid to the dairy or the raising of cattle. Average price at 3 years old, $10 per head. Our county has been celebrated as

producing the best hogs in the State; and I know of no better stock than the old Warren county breed, which was produced by crossing the Russia and China breeds; they have good size, fine bone, feed well, and will fatten at any age. As to how many pounds of pork 100 pounds of corn will make, I can say, from my own experience, that after hogs have been put up to fatten, every 100 pounds of corn fed to a fair lot of hogs will increase their weight 10 pounds. Tobacco culture is on the increase; yield per acre, 1500 to 1800 pounds. Potatoes are the most uncertain of all our crops, their product varying from 50 to 500 bushels per acre, according to the season; this year it was less than 50 bushels per acre, owing to excessive drought, which has lessened our corn and oat crop fully one-third. Of fruits, if we may be allowed to judge from the exhibition at the horticultural fair, held at Cincinnati in October last, our county bids fair to rival any other part of the Union, both as regards variety, quality, and quantity. In our own county, almost every farm has an orchard, generally of select apples, with a few pear and peach trees. The latter is an uncertain crop, liable to be winter-killed. We know of no effectual remedy for the blight in pear-trees; and, as a consequence, are losing our trees. Apple-trees are not seriously affected by blight, though, for some years past, the bitter rot has rendered some of our best varieties worthless. I have found a palliation of this evil by digging off the top soil down to the roots, and manuring well with chip-manure, or with rotten wood and leaves. Some of the Newtown pippin trees, which I treated in this way last year, bore sound fruit this year, while that on trees of the same kind in an adjoining row was all rotten. We use what manure our barnyards afford, putting it upon the thinnest part of our fields, either for corn or wheat, doing no more than what has been done in this vicinity within the present generation, viz. to pull down our barns to get them out of the manure which had accumulated around them.

Respectfully, yours,

J. P. SCHENCK.

West Springfield, Mass., December 24th, 1850.

Sir:—The following table will show the quantity of rain which fell at Springfield during the year ending October 31st, 1850, as indicated by the rain-gauge in the care of Mr. Lucius Allen, at the United States Armory.

Nov. 1849	2.56 in.	March, 1850	2.94 in.	July, 1850	5.28 in.
Dec. "	2.04 "	April "	4.29 "	Aug. "	5.94 "
Jan. 1850	4.18 "	May "	8.21 "	Sept. "	5.78 "
Feb. "	3.67 "	June "	3.55 "	Oct. "	4.03 "

Coldest day, February 6th, 5° below zero.

Warmest day, June 19th, 90° above zero.

Thermometer hanging on the north side of a tree.

The census returns will probably give you all the necessary information relative to crops, &c. There is little change from last year worthy of note, except that more broom-corn and tobacco has been raised than usual. Tobacco has been a profitable crop, yielding 1800 or 2000 pounds per acre, and selling at 12½ cents per pound. Potatoes have yielded a light crop, and have rotted worse than ever before. The cultivation of fruit is receiv-

ing increased attention; and the best varieties of apples for winter use are the Baldwin, Rhode Island Greening, and Roxbury Russet. I usually transplant my apple-trees in the fall; I dig a hole large enough to accommodate the roots, and about a foot deep, then fill it with rich earth.

Cellars under barns and stables are coming into use, and are undoubtedly good for preserving manure from waste. Lime is used but little as a fertilizer. Plaster is sown on grass land at the rate of 1 to 2 bushels per acre, and put upon corn and potatoes with good effect, generally about a spoonful to each hill.

Respectfully yours,
AARON BAGG.

Floral Retreat, near Columbia, Lancaster County, Pa.

Sir:—Having been favored with a copy of your circular, soliciting information relative to agriculture, crops, modes of farming, &c. &c., I cheerfully comply, so far as my limited experience may enable to aid in imparting the desired information. I shall reply in the order designated in the circular.

Wheat.—This grain is the staple of Lancaster county. The varieties cultivated generally are Mediterranean, red blue-stem, white blue-stem, red-chaff, smooth and bearded, Hershey's white, Oregon, white flint, besides others designated by local names. The Mediterranean seems to take precedence of all others as a *sure* crop. It does not produce the finest quality of flour, nor perhaps quite so large a yield as some others; on a medium quality of ground, it will yield from 20 to 30—and we have known it to reach 42 bushels per acre; is far less subject to casualties, such as fly, mildew, rust, &c. It is not fly-proof, as was supposed, but *recovers* after being attacked by fly, much better than any other variety. Rich, strong soils do not suit it so well, as it is then likely to lodge, and is generally sown on wheat stubble as a second wheat crop, instead of rye. The average product of wheat of all kinds, I should judge to be about 20 bushels per acre, say for the last 10 years.

Our system of farming, or rotation of crops, is generally in the following order: 1st. We commence on a clover lay or sod that has been in grass for 2, 3, or 4 years, having during this time produced annually from 2 to 3 tons of hay per acre, or been pastured a part of this time: this is well ploughed in the fall, say 8 inches deep, (subsoiling will soon be introduced,) and sometimes limed at the rate of 80 bushels per acre, and well mixed with the soil by harrowing; the next spring it is well pulverized by going over with the harrow or cultivator, or both, and is then furrowed out 3 to 4 feet apart, and planted in corn, about the first week in May, sooner or later, according to the season. Some plant in hills, 3 or 4 grains in each, and work with the cultivator both ways—others plant the grains single, 10 to 12 inches apart. The crop is then well worked during its growth with the cultivator, and, when the corn is from 8 to 12 inches high, the double mould-board plough is drawn between the rows by a span of horses, throwing up a light furrow on each side. The cornfield is then left without further attention (except pulling off the suckers, if any appear) until the corn is nearly ripe, when it is cut off at the roots, put in small shocks till perfectly dry; it is then husked, and the fodder stacked and fed out to stock during the winter.

The varieties generally cultivated are the different kinds of gourd-seed; and the average product per acre I suppose to be about 50 bushels, though 80 and even 100 are not uncommon. The cost of production per bushel I am not able to give accurately, as the difference in cost of raising 100 bushels per acre is very little over that of raising 20. The ploughing, planting, tending, &c. is nearly the same for a small crop as for a large one. Ten dollars per acre I believe to be near the cost of labor for a crop of corn; consequently, if we raise 20 bushels to the acre, the cost of production will be 50 cents per bushel; or, if the yield should be 100 bushels per acre, the cost may be a little over 10 cents per bushel. The true answer will be intermediate, according to the quantity produced.

The best method of feeding:—The corn is ground into meal: sometimes the corn and cob are ground together, and those who have fed in that way say they do not believe the cob to contain much nutriment, nevertheless think there is a great saving of corn. To explain the *rationale* would, however, extend this paper to too great length. Steaming or cooking would be preferable; but whether more economical, I am not prepared to say.

Oats, Barley, Rye, Peas, and Beans.—Average yield of oats I should suppose to be about 50 bushels per acre; 2 or 3 bushels of seed sown to the acre. This crop is a great exhauster of the soil, yet it is almost universally sown after corn; the ground is well manured with stable-dung, partially decomposed, as soon as the oats are removed, preparatory to sowing the ground in wheat. Barley is not so much cultivated, owing to a limited demand; the crop is uncertain, and the price fluctuating. This grain is much less exhausting than oats; 2½ to 3 bushels is the quantity sown per acre. Peas and beans are not cultivated in Lancaster county, to my knowledge, as a field crop. After the oat crop is removed, stable-manure is spread on the ground, and ploughed under as soon as convenient; about the middle of September, the ground is again ploughed and sown with wheat, generally with the drill, of late. After this crop of wheat is removed, the ground is ploughed once more, and Mediterranean wheat or rye sown with grass-seed, to remain in grass 3 or 4 years, when the same rotation is again commenced—1st, corn; 2d, oats; 3d, wheat; 4th, wheat.

Clover and Grasses.—The quantity of hay cut per acre varies from 1 to 4 tons, and the quantity of seed sown per acre from 3 to 6 quarts. For laying down pastures or mowing-lands, red clover and timothy are the only grasses used; sometimes a lot is sown with orchard grass, but is not much approved. Lucerne, saintfoin, Italian rye-grass, tall meadow-oat, Gama grass, and others have been tried, but are not likely to displace clover and timothy. There are no permanent meadows, properly so called, except such as can command a stream of water; these seldom receive any fertilizers but what is contained in the water used in overflowing them: with a sufficiency of this element to irrigate them at proper times, 3 or 4 tons of excellent hay may be taken from each acre at two mowings, besides the aftermath fed on the ground in the fall by stock. Such meadows are a valuable appendage to a farm.

Dairy Husbandry.—I have no data from which to give any thing like a correct estimate of the average yearly produce of butter or cheese per cow. Farmers here keep from 4 to 12 cows each; milk twice a day, and keep the milk in a cool spring-house in summer, and, during cold weather, in a heated room; the cream is taken off as soon as it becomes sour, and kept in large crocks from 3 to 6 days; it is then churned, and the butter

washed in cold water till the buttermilk is all out; it is then lightly salted for immediate use, or more salt is used if intended for preservation. The farmers' wives usually take it to market or exchange it for groceries as soon as made, and the country storekeepers resalt and pack it in small firkins, to send to other markets. Lancaster county butter "can't be beat."

The cost of rearing neat cattle till 3 years old is quite as much as they are worth; consequently few are reared except for cows, and occasionally a bull-calf. All the stock fattened in this section is brought from the Western States—it is cheaper to buy than to raise it. The cost of a 3 year old is from $15 to $30, according to size.

Sheep and Wool.—The keeping of sheep is not much attended to here, owing mainly, I think, to the risk of losing them by vicious dogs. Some farmers keep a few long-woolled sheep for their own wants. Were it not for this danger of loss from dogs, the raising of sheep might be made a very lucrative business.

Hogs.—The Chester county breed is considered more valuable than any other, from their large size, early maturity, easy keep, and peculiar aptitude to take on fat. The only objection that can be brought against them is, they are poor breeders; a mixture with our common hog is by many considered desirable: they become more prolific, and, though smaller, are equally valuable. Hogs are here allowed to range over the pasture fields, orchards, &c., during the summer, and, with the spare milk and refuse from the kitchen and garden, they thrive well. In the fall they are confined in pens, and fed on corn for a few weeks, till killing time. The pork is cured with ground alum and salt, and smoked with green hickory wood, or, what is preferred by many, corncobs.

Cotton, *rice*, and *sugar-cane*, not cultivated.

It is only a few years since that *tobacco* began to be cultivated in this vicinity. It is now largely on the increase, and, should the present high price continue, it will soon take a place in our regular rotation of crops. The price is now from $10 to $16 per 100 pounds. At these prices, it is the most profitable crop that can be raised in this section of country. The average product per acre may be near 1000 pounds; still, twice this quantity is not uncommon on strong land, with a favorable season and good attendance. Yet it is thought to be very exhausting to the soil, requiring much manure to produce a large crop. I entertain the belief that it is not more exhausting than wheat or oats, provided it is not grown upon the same ground year after year, but changed from one field to another, the same as grain and grass, giving the soil an interval of six or seven years before it is again raised on the same ground, taking a regular course in the rotation. Tobacco is a good feeder, and all kinds of manure seem acceptable and beneficial; coarse stable-manure, lime, ashes, plaster, even anthracite coal-ashes have been used with manifest advantage. Guano, bone-dust, poudrette, or any kind of artificial compost would undoubtedly fully compensate for its application in the increase of the crop. The variety termed *seed-leaf* is the most esteemed here. Lancaster county tobacco is considered a very superior article.

Hemp.—Twenty years since, almost every farmer had his hemp patch, of one-fourth or one-half an acre; now there is none cultivated. The low price of cotton fabrics has superseded this article.

Root Crops.—Turnips, carrots, beets, &c. These are not cultivated as field crops.

Potatoes.—The common potato has of late become a very uncertain crop; sometimes the rot destroys them, and generally the plant seems to have lost that vigor and health it formerly had: the best success seems to attend early planting, and on moderately dry soil.

The cultivation of fruit does not receive that attention which its importance demands. As a matter of course, every farm has its apple orchard, producing a full crop every second year, unless cut off by frost, or some other casualty. There are many causes operating to produce this state of things, among which is the want of a market. When the trees produce a full crop, the price of fruit will not compensate the fruit-grower for his trouble in picking and hauling to market. Another is the depredations committed by lawless bipeds, who prowl about the country and appropriate to their own use the best fruit. The pear is so generally destroyed by the blight, that very few trees are to be found. We know of no remedy when the trees are once affected. In a soil that is not disturbed by the plough, of a tenacious nature, and deep, with a sod of grass over the roots, and not two dry, the trees will then grow more slow, become hardier, and much less subject to blight than in a rich and cultivated soil, but the fruit will not be so fine. Peaches succeed admirably on elevated ground, where they are less subject to late spring frosts. The worms are easily prevented from doing damage, by protecting the stems of the trees about one foot from the ground. A few shovels full of leached ashes, heaped around the trunks early in the spring, and left there during the summer, are as good a preventive against the fly as any thing else. The yellows are now well known to be contagious, and during the time of inflorescence, the wind, bees, and other insects, in search of honey, convey the diseased pollen from tree to tree—thus in a short time infecting a large number of trees. The only remedy for this disease is *to lay the axe to the root*, and remove it without loss of time.

Plums, *apricots*, and *nectarines* are annually destroyed by the curculio—consequently not much cultivated. There is, however, a much stronger interest felt towards cultivating good fruit than formerly, and we trust that ere long horticulture will be more generally appreciated.

With great respect, I remain, &c.

J. B. GARBER.

Sir:—Your circular of August last having been received, desiring information from all practical men having had experience in the various matters therein set forth, I take the liberty of making a few suggestions on the raising and management of neat cattle. First, you wish to know the expense of raising till 3 years old, usual price at that age, value of good dairy-cows in spring and fall. In reply to these inquiries, I would say it depends very much on the animal, its kind. The Devon is undoubtedly raised and kept till that age at the least expense, being a small animal, and of gentle disposition. The Durham, being larger, will cost more. The grade, being a mixture of Devon or Durham and native, &c., will probably equal the expense of the Durham; and the native, being of such variety, it would depend much upon its kind to determine its cost. The Holderness will probably equal the cost of the Durham. The Hereford not having been raised much in this section, I am not prepared to decide upon its merits, or the expense of raising, or value of the animal. To have cattle valuable, at any age, much depends upon their keeping. The better they are kept, the more profitable the re-

turn. Calves should never want suitable food until they are at least one year old. Being kept well and in first-rate condition at that age, they will then provide for themselves, good pasture and water being accessible to them. The expense of raising is, in Western New York, $15 per head, and their average value $20; although I have raised some that cost more, and their value at that age much more. To make the greatest profit, I should prefer the grade. Good dairy-cows are worth, and have been for years past, in the fall, $15; in the spring, $22 per head; and some extras, above this price. A volume might be written on the raising and management of neat cattle; but experience will teach more. Sheep, like cattle, when well cared for, are very profitable: perhaps, at the present time, more so than cattle. Much, however, depends upon their management and the attention paid them.

Yours respectfully,

AARON RILEY.

To THOMAS EWBANK, Esq.,
Commissioner of Patents, &c.

East Aurora, Erie County, New York, December 18th, 1850.

Woodland, North Manheim Township, Schuylkill County, Pa.
October 23d, 1850.

Dear Sir:—In responding to the circular from the Patent Office, dated Washington, August 26th, 1850, I have prepared a few remarks on the agricultural productionss of this county.

The neighborhood was early settled by the Germans, who took up lands to cultivate, the greater part of which being mountainous and rough, a small portion only fit to cultivate, was worked so hard by the sturdy farmer, that long since they have been in some measure abandoned for richer soils in the West. But, since the discovery and working of the anthracite as a fuel, it has brought thousands of hardy, working miners to this region, thus erecting a good market for all productions of the farm, and giving a stimulus to the farmer to manure and lime his worn-out land. Aided by a rotation of crops and better tillage, they have brought those worn-out fields to a high state of cultivation, producing good crops of wheat, rye, barley, buckwheat, Indian corn, potatoes, turnips, and all the hardy vegetables and fruits of our northern climate.

The meadow land produces the finest crops of timothy, say from one and a half to two and a half tons of hay to the acre. I am in the habit of sowing from six to eight pounds of seed to the acre.

Indian corn grows most luxuriantly, and produces large ears and grains. I have cultivated the common yellow, white flint, gourd-seed, Black Hawk, Tuscarora, and sweet or sugar corn, besides other varieties. The sample of white corn received last spring from your office, through the politeness of the Hon. C. W. Pitman, came so late in the season that it did not come to perfection before the frost overtook it.

The general yield, on good land, is about 40 bushels to the acre.

Wheat.—The blue-stem, red-top, bearded, and the Mediterranean are mostly grown in this neighborhood. The product is about 30 bushels to the acre. We sow the first week in October, and harvest from the 8th to the 10th of July, and plough twice.

Oats grow well. I have raised the common, but give the preference to the black oat. The average yield is 40 to 50 bushels to the acre. Two bushels of seed are sown to the acre.

Rye grows well and tall, yielding 20 bushels to the acre. Sow 1½ bushel to the acre.

Potatoes.—Red, white, and pink-eye are generally preferred, as the most profitable, yielding 200 bushels to the acre in sod. In low and wet places, the rot has shortened the crops for the last few years. The variety of hogs mostly esteemed are the Berkshire and Chester county. A cross of the two produces a good variety, and easily fatted.

Very respectfully yours, &c.

RUBENS PEALE.

Hon. THOMAS EWBANK,
Commissioner of Patents.

New Steubenville, Brooke County, Virginia,
December 15th, 1850.

Wheat.—Varieties in use are red-chaff bearded, club, white and red smooth, blue-stem, and Mediterranean; the last is not much in favor, it being about the poorest yield of any. Average product, about 20 bushels per acre. Best yield on limestone land. Seeding generally done about the last of September and first of October. Harvesting done first of July. No preparation of seed other than having it clean. Quantity sown per acre, from a bushel and a peck to a bushel and a half. Hard land is sometimes ploughed twice, but generally but one good ploughing of from eight to ten inches deep. The ground should be ploughed several weeks before sowing, and well pulverized before sowing. Never sow too wet; better to sow in the dust than too wet. The yield is rather on the increase. The practice here is to sow wheat one season, and then let the field lie in grass one season, and also to plant corn, and the next spring to sow the same ground in oats; then sow the oats stubble in wheat, which answers very well. There is very little difference in the yield on one or two ploughings, provided it is well done. I know of no remedy for either the Hessian-fly or weevil. The average price so far, in Steubenville, has been about 72 cents per bushel.

Corn.—The best variety for this section of country is the common yellow corn, not too deep in the grain. The product per acre will average somewhere between 50 and 75 bushels. Cost of production, about seven or eight cents per bushel. Plough your ground deep, and never when wet; harrow well before planting. It is a very good plan to harrow the ground over several days after planting, taking care to straddle each row. This helps to pulverize the ground, and also to keep back the weeds until the corn is up. After the corn is up, my plan is to take a one-horse barshare plough, and go through my corn and throw the dirt from the corn; the next week, to go through with a one-horse harrow, once or twice in a row, according as it may seem to require; next, with a double shovel plough, or cultivator, as may seem best; and so on, until harvest time, keeping the ground well stirred, each time following with hoes, more or less, as the case may require, taking good care not to work the ground too wet. Some of the questions you ask are too hard for me. I must, therefore, leave them for more scientific heads to cipher out.

Oats and Barley.—Not very extensively raised.

Fruit culture is receiving increased attention in this part of the country, particularly apples. Great care is taken to plant none but the best grafted fruit. A good orchard here will average about $50 per acre. Our principal market for apples is the river. I never have found apples of any consequence as food for stock. Some of the best for keeping are, the Newtown pippins, Russets, Romanites, Lopsides, and Spitzenburg. The Gates are among the best fall apples we have.

The peach-trees have mostly died here, although, I think, they might be preserved, with care and attention to apply hot soapsuds to the roots about the months of May and June. The "yellows" I believe to be produced by the worms at the root; destroy them, and the tree becomes healthy. To bind refuse tobacco about the body, near the ground, the first of June, is also a preventive of the worm. I might write more, but suppose you will receive a great number of communications from persons better calculated to give information than I am.

I remain yours, &c.

LEWIS BROWNING, Jr.

Mr. Thomas Ewbank.

Somerset, Hillsdale County, Michigan.

Sir:—In reply to your Agricultural Circular of August 26th, I shall make but a few limited remarks.

1st. Wheat.—There are a great many varieties grown in this section. The best varieties are the Siberian, Soules, Indiana, and white-flint; the first is commonly called the choicest kind. At present, however, the Indiana and flint are both extensively grown, with good success. It is too generally the case here that *any thing* is sown for seed, instead of procuring a choice article. The difference in our markets between superior and inferior wheat is so trifling that the farmer is but poorly paid for his trouble in procuring a good article for seed. My opinion is, that if all wheat-growers here would adopt the plan of sowing none but the choicest varieties for two years, the result would be, at the end of that time, an advance of 10 per cent. on Michigan flour in the New York market. The average product per acre is about 15 bushels; the present year, a great many fields have averaged 20, 30, and even as high as 40 bushels per acre.

Time of Seeding.—The month of September, from 10th to 15th, is the best time.

Harvesting.—From 10th to 25th of July. Seed per acre, from one to one and a half bushels. If ground is well prepared, and sown early, one bushel is sufficient, but one and a half bushel is generally used.

Ploughing.—Plough twice, about seven inches deep. The yield per acre is not diminishing; on the contrary, if the crop is threshed on the field, and the straw ploughed in the next year, and a flock of sheep kept on the ground, to prevent the weeds from seeding, the crop will *increase.*

Average price, at our nearest markets, 65 cts.; last year, 80 to 85 cts.

2d. Corn.—The most esteemed varieties are the yellow and white dent. Average product per acre, 35 to 40 bushels; in some instances, the yield reaches as high as 80 per acre. Cost per bushel, 20 to 25 cents. Best method of *feeding* is to have it ground, and, for swine, to have it cooked.

3d. Oats.—Average yield per acre, 33 bushels; quantity of seed per acre, 2 bushels.

4th. Sheep and Wool.—Wool-growing is profitable. Fine wool at 30 to 33 cents per pound, coarse and medium at 25 to 27 cents per pound, are considered fair market prices here. Fine, long Merino wool can be produced, at the above rates, with more profit than coarse wool, at the corresponding rates.

5th. Fruit.—The culture of fruit is receiving a marked attention, although the country is yet in its infancy in regard to that important item. Apples have been sent from this State to Europe, at a good profit to the grower.

With due respect, yours, etc.

CHESTER HUNT.

Jonesborough, Washington County, Maine,
December 18th, 1850.

Sir:—I acknowledge the receipt of your "Agricultural Circular" of inquiries relating to the farming interest, particularly confining myself to this vicinity. I proceed to answer such of your queries as have fallen under my observation and experience.

Maine is not an agricultural State: her people, relying on different resources for a subsistence, turn their attention to the development and improvement of these resources, leaving the cultivation of mother Earth, as though of insufficient importance and utility to expend their industry upon. The manufacture of lumber has so deeply engaged our people, it may be considered as constituting the principal branch of labor; in fact, it forms a striking characteristic of the inhabitants of the eastern and newly-settled counties of Maine. Our grandfathers and fathers were lumbermen, and we seem strongly inclined to follow in their footsteps. Hence, the boy of twelve thinks as much of cutting and drawing his "timber stick" or his "saw-log" from the forest as the man of forty; and the first start of the young man, when he sets up for himself in life, drifts naturally towards some branch of this great "State advantage." Now, it is easily perceived why so little attention is given to agricultural labor, it heretofore having been neglected; and the people seem quite unwilling to quit old pursuits, and engage in what they consider uncertain and unprofitable. But this unfavorable impression begins to slacken its hold upon the public mind; and as causes multiply to lessen the productiveness of lumber manufacture, the same causes produce a more favorable inclination towards agriculture. It may be said, and in truth, that our climate is not such as to encourage the farmer in the attempt to effect the productions of milder and more southern latitudes; yet, it is well adapted to the cultivation of oats, barley, peas, beans, potatoes, root-crops, the grasses; and, in the older settled and western counties, corn and wheat are raised with no inconsiderable success. Many of the farmers in the Kennebec valley are turning their attention to raising stock: their lands being well adapted to grazing, renders it profitable in furnishing beef cattle for the Western markets, and working-oxen for lumbermen in our own State.

The past season has been rather unfavorable to farmers, from a variety of causes. Snow lay on late in the spring, there being a fall of two feet

on the level, 16th April, and disappeared only through the agency of the sun: cold and heavy rains succeeded, rendering May, our month of seed-time, cold and unpleasant. June gave beautiful weather, while July and August were extremely dry, vegetation suffering much. 25th August, frost in low land, scorching pumpkins, beans, &c., stopping their growth for the season. 1st September, heavy rain; 10th, the potato-tops showed signs of the plague, universally complained of as killing the stalks, and in most cases affecting the tubes. Our hottest weather was in July, when the thermometer ranged above 90° in the shade. It may be proper here to remark, that the past winter was unusually mild and open. The 10th of February, we had a warm rain, and the weather, for three weeks in succession, was spring-like, even inducing the robins to quit their winter quarters, and appear in flocks in the open land!

Wheat.—A field of wheat is now seldom seen in our vicinity. Its cultivation has been very nearly abandoned within the last five years, and unless something now unanticipated should occur to encourage its restoration, and give it the productiveness of former days, it will be lost entirely, and quite forgotten. The rust and mildew have been the great enemies of wheat, so much so, that that once staple crop of our county has been completely subjugated and driven from the soil.

Corn.—Heretofore, this article has not been much cultivated; but since the failure of wheat, our farmers feel disposed to plant a little corn: not enough, however, is raised at present to justify an attempt to enumerate cost of raising, or quantity procured from the acre. It is encouraging to know that the impression obtains very generally among farmers, that it might be raised to advantage; and there is but little doubt, if seasons continue favorable, considerable quantities will be raised in Washington county. Of the varieties used, the Canadian (eight-rowed) is preferable, better suited to soil and climate, yields more, and of superior quality to other kinds now used. When used as feed for cattle or hogs, should be ground and scalded; so agree all who are practical experimenters in the matter. When fed to poultry, is better "round."

Barley.—This grain is raised quite extensively in this county—is found profitable feed for hogs and poultry, always commanding a price equal to corn, varying from 80 cents to $1 per bushel. Loamy soil is preferable for barley: pasture-lands, or old cultivated grass-lands, with a fall ploughing, will yield a good crop. 20 bushels is considered about an average crop per acre; it is considered less draining to soil than wheat or oats. Quantity sown per acre, 2 bushels; time of sowing, from 20th May till 10th of June.

Oats.—All our farmers raise more or less of this grain. It is peculiarly adapted to our soil and climate, commands a good price as feed for horses, cattle, hogs, and poultry; and then the straw (which is better for cattle than the coarse grasses of the meadow) pays for all expense of cultivation. Three bushels to an acre is light seed enough, taking seasons together; dry weather is injurious; hence, if thick sown, will stand it better, thereby retaining the dews and moisture of the soil. 25 bushels per acre probably an average crop, though some would place it higher. Without extra labor, 40, sometimes 50 bushels are obtained from the acre. Time of sowing, the first week in May. Earlier sown, earlier ripe, and fuller and heavier grain. In the fall and winter are worth 50 cents per bushel; in spring, 60 and 75 cents. Previous to the failure of wheat and potatoes, oats were not much cultivated, the opinion generally prevailing that they were exhausting to

the soil, but now a very different impression prevails, and are often used in stocking lands.

Peas are not raised in large quantities, though nearly all our farmers raise enough for home consumption. They constitute a valuable dish when green, and during winter months a healthy soup is ofttimes served up from them. Are considered renovating to soil: when mixed and ground with oats and barley, are a valuable feed for hogs and cattle. One and a half bushel to an acre for seed. Average crop, 20 bushels; generally worth $1 per bushel. Haulms of little use, except to strew in the hog-yard, where they are readily converted into dressing, again to be spread upon the fields.

Beans.—Nearly every farm has its patch of beans. I have known them raised for 10 years in succession, giving a fair crop on the same piece of ground. Our farmers are beginning to learn that it is cheaper to raise their beans than to buy them; hence an increased attention is very manifest in their culture. Time of ploughing, 15th to 20th May; price, $2 per bushel. Some plant corn, beans, and pumpkins in the same hill; but this is injurious, and prevents the growth of all; beans in particular should be planted by themselves.

Hay.—The last two years have been unfavorable for raising hay. An increase, however, of 25 per cent. for the crop of 1850 over 1849 may safely be allowed, and then not have more than 75 per cent. of what we formerly obtained. Quantity per acre this season, including highlands and intervales, (what some would term meadows, being the low lands on the banks of rivers,) 1¼ ton. Intervale mowing lands need no fertilizers other than what the flow of the rivers in spring and fall spread upon them. By the agency of the water in its coursing over them, they become as smooth as if wrought upon by man. After once cleared, they require no other attention than a day of labor, (on a patch of 3 acres,) in the spring, removing the drift stuff carried on by the freshets. These lands seldom fail of producing two tons to the acre, principally "brown-top," which commands a price in the market little inferior to best highland hay. *No fertilizer* is better for English grass fields than stable manure, either ploughed in previous to stocking, or spread on the sward of old fields in the fall, say October: the latter mode is much practised, and is thought as profitable as the former. Average price of hay $12 per ton, some seasons as high as $18. I think the cost of growing hay is about $3 per ton. This may seem low at first, but, by correct estimation, I think it an average cost.

Cattle.—Good dairy-cows, in spring, are worth $30; in fall, about $18. To the question, "Cost of raising cattle till 3 years old?" I find various opinions are entertained. All seem to think that they cost more than they are worth in the market; but their reckoning is this wise: allowing 3 tons of hay (little enough) to each animal till 3 years old, and that hay worth no more than $10 per ton, we have $30 as cost of raising, while the average price of the animal is only $15! Another method of reckoning, and in my opinion the correct one, is to put the hay at actual cost of raising, (which is about $3 per ton,) allowing the manure to pay for pasturing and care bestowed through winters, and we have fair profits in raising the animal. Were all our stock raised attendant with the cost estimate of the former method, it would cost triple its value at any age, or in any condition.

Many are induced thus to consider the matter; but when we take into consideration that we could raise but little hay without stock, that stock on the farm is what *makes the farm*, we shall be inclined to more liberal cal-

culations. Upwards of 14,000 cattle were received at Cambridge market, (Massachusetts,) from the western and central counties of Maine, during the year ending November 1st, 1850. This business has sprung up very recently, and, by the great increase of last year over former years, it is inferred that the farmers of these counties find it profitable in furnishing beef cattle for that and other western markets. Working oxen vary in price from $50 to $100.

Sheep.—There are no animals kept on the farm more profitable than sheep. In summer they provide for themselves, and the expense of keeping through winter is more than doubly exceeded by the income. In the first place, the lamb raised by the old sheep at six months old is worth $1.50, and then the fleece, say 4 pounds, (which is an average,) at 25 cents, $1, leaving still the carcass of the old one, worth $2, which amply pays all expense of keeping. About 17,000 sheep have been driven from Maine to Cambridge, (Massachusetts,) where a good market is always found, within the present year. Our flocks are mostly a mixture of Saxony and Merinos, and we find that the larger the sheep, the more and better wool, and the same with regard to increase. The proportion of lambs raised to ewes is about 80 per cent.

Root Crops.—Not extensively cultivated as a field crop, yet nearly every homestead has its garden; average worth, about 12 cents per bushel.

Potatoes.—Our farmers have become almost discouraged in the attempt to raise potatoes, by the return of the "plague," the past season, more destructive than ever before. Potatoes generally, were planted in May, came up and grew well till 1st of September, when, after a smart rain, the cry commenced at the same time all round, "The plague's come," and, sure enough, it had. Nowhere, in a day's travel, could you see a field without the darkish hue upon it. Some dug and put them in their cellars before the tubers were affected, and were wise in so doing, while others concluded to let them rot it out, and they did so pretty effectually. The only means practised successfully to avoid the rot is early planting and digging. Some individual had notions of *experimenting*, which they boasted of as being sure preventives, but, the present season, it showed no respect of persons, performing its mission trustworthily and well. Crop of 1850 about half of 1849. Price, 50 to 75 cents per bushel.

Orcharding, like many other branches of the agricultural interest, is gaining increased attention in this county. It is not deemed of sufficient interest to give it a minute description in this Report. Price of apples, seldom less than 50 cents.

It is found exceedingly difficult to collect accurate and satisfactory information, as answers to many of the questions in your circular. Farming here is generally carried on without any particular system, each annually pursuing such a course as seems best calculated to insure success; hence a variety of systems are practised. Our farmers universally give more attention to growing hay than any other crop, and seldom yet has the supply equalled the demand. No other crop pays so well as this, and few are better adapted to soil and climate. Prices, too, are such as would seem inviting enough to hay-growers, to produce enough for home consumption. It is a cash article generally, and times are hard indeed when it cannot be exchanged for flour, corn, &c. So long as lumbering is prosecuted to the extent that it now is, hay will always be in good demand, whether produced in our own county or imported from abroad.

If the above will be of any service in making up your Annual Report to Congress, you are at liberty to arrange it to your convenience. The package of seed forwarded me last spring, I sowed and cultivated on choice grounds, many of which produced well. In future, if my services will be of any utility, I shall be pleased to render all due assistance. I think your labors are deserving of the highest success, comprising, as your Reports do, a volume of agricultural information, not surpassed by any other, and, when once known only, will be appreciated and admired.

Yours, with high respect,

GEORGE W. DRISKO.

Hon. THOMAS EWBANK,
Commissioner of Patents.

New Lebanon, New York, December 11th, 1850.

Friend:—I received your circular in due season, and now attempt a reply.

Wheat.—Very little is grown in our township, because of its tendency to winter-kill. Our soil being generally what might be termed an argillaceous mould, resting upon a firm hard pan, which renders it so retentive of a superabundance of moisture, that winter grains, unless a slight coating of litter be thrown over them, are very apt to be thrown out by frosts in early spring. Some wheat, however, is grown; average per acre, about 15 bushels. It is badly injured by the fly. Late sown, best—effete lime, sown upon it while wet with dew, is beneficial to prevent the fly.

Corn.—The kinds mostly cultivated in our neighborhood are early Canada, ninety days, and eight-rowed yellow. Dutton has been grown some—is not admired. Best method of culture with us is to put green manure upon the sward early in the spring; turn carefully under, and pretty flat; roll down; harrow up a tilth, also harrow in a few loads per acre of well-rotted manure, with about 4 bushels of salt; as soon as corn is large enough to weed, dress it with a hoe, and add to each hill a handful of unleached ashes and plaster. Average product per acre, 50 to 75 bushels. We never feed whole corn; think it enough better when ground to quadruple the cost of grinding. We greatly prefer cooked feed.

Oats.—Largely cultivated; average yield per acre, 25 to 60 bushels; about 3 bushels seed to the acre; sown on green sward, inverted and harrowed.

Barley always succeeds well in a rotation after a hoed crop; for seeding down, is preferred before any other grain, because it is of quick growth, thus furnishing shade for the germinating grasses, and comes off early, thus giving them a chance to grow when started. It is extensively used with oats and corn for feeding. Average per acre, 40 to 60 bushels.

Peas are but little cultivated as a field crop; neither are *beans*.

Rye is extensively raised on certain locations, being generally a sure crop. Average per acre, about 15 bushels. Barley, with us, is considered the least exhausting to the soil.

About an average quantity of English hay per acre, on newly-seeded land—2 to 3 tons; old meadow, about 1 ton. We prefer herds-grass or timothy, with Southern red clover for meadows; about 8 quarts of timothy and 4 of clover is generally sown to the acre. Best fertilizers for our mea-

dows and pastures generally are plaster and ashes, about 25 bushels per acre. Cost of hay per ton, say $9 to $12.

About an average yield of butter and cheese per cow, in our neighborhood, is 120 pounds butter, 100 pounds cheese. Our method of treating the milk for butter is to strain immediately from the cow and put into tin pans about 3 inches deep, filling about 2 inches deep, and set upon shelves exposed in warm weather to a free circulation of air, in such way as not to ruffle the cream. In very warm weather we set our milk in refrigerating sinks, made of stone or cement, exposed to a spring or passing current of cold water. In very cold weather, fire is made in our dairies, so as to keep the temperature about 60 degrees. We endeavor, by the means of refrigeration in warm weather and warmth in very cold weather, to keep the cream at nearly a uniform temperature. If the cream is cold, warm it to about 60 degrees, and if very warm, cool it with ice before putting into the churn. Modes of churning are various; both dasher and revolving churns are used. All churning by hand is done with the revolving churns; some of these will frequently churn 30 pounds of butter in 15 minutes, in the fall and spring. We do not perceive so much difference in the mode of churning as in the state of the cream, as to the time it takes. Mode of putting down butter for market is, in substance, as follows:—Clean oaken firkins, or earthen pots, are prepared by scalding in brine and wheat-bran water, or by soaking in it 12 hours previous to using, then wipe dry. A layer of fine rock salt, washed before being ground, is then spread upon the bottom, and between each layer till the vessel is full; the layers about 3 inches thick. The butter is thoroughly worked with a butter-ladle, or a fluted concentric butter-roller, until all the buttermilk is extracted, and then about 12 ounces of clean rock salt, 4 ounces saltpetre, and 4 ounces sugar are worked into 10 pounds butter: it is then packed down, and has been pronounced, by the best judges, to be new butter at nearly a year old, and has been sold in New York at 20 cents per pound, when the common price was 16 to 18 cents. Made in one dairy of 20 cows, the past year, 2000 pounds butter, 1200 pounds cheese; besides furnishing new milk for about 75 persons to use at table as drink, and about 4 times per week as food. In another dairy, of 40 cows, about 5200 pounds of butter and 3044 pounds cheese have been made; in another, of 40 cows, 4000 pounds butter, and 3000 pounds cheese; and, in a fourth, of 18 cows, 2410 pounds butter, and 2040 pounds cheese—in 1850. Thus making an

Average to each cow in dairy	No. 1,	of	100	lbs.	butter and	60	lbs. cheese,
" " "	No. 2,		130	"		76	"
" " "	No. 3,		100	"		75	"
" " "	No. 4,		134	"		113	"

It should be observed, that each of these dairies has furnished milk for food and drink for about the same number of persons, in proportion, as dairy No. 1. The manner in which cheese is made by the society of Shakers is simply as follows:—The milk at night is set in a large tub, the morning milking is put in with it, and then warmed to 60 or 65 degrees; add about 1 gill of rennet to 12 gallons of milk; it is then allowed to set until curded, say 2 hours, and then gently cut through and through in the tub with a long wooden knife, to let out the whey; after a few minutes it is carefully broken with the hands and the whey dipped off; this operation is repeated

at short intervals, until sufficiently drained to put into a strainer, and, after remaining half an hour, it is cut into slices and put in a cloth, with a little weight upon it; this operation is 3 times repeated, at intervals of half an hour, increasing the weight each time; it is then cut in pieces of about half an inch square, and put in a cloth, and thence into the curb and press; after pressing until thoroughly drained, it is taken out, cut up a little finer than before, and scalded about 5 minutes in sweet whey and water; then dripped, and about half a pound of clean fine rock-salt is added to the curd of 12 gallons of milk, and again put into the hoop for a final pressing. Our cheese has sometimes sold for 20 cents per pound; but we do not manufacture for sale. An average price would be 8 cents per pound for new cheese, and 16 to 18 cents for that a year old.

Neat Cattle.—Very few young cattle are raised for sale in our neighborhood. Average price of milch-cows, in fall, $30 to $50 each, and in spring, $40 to $60. It is generally believed, among us, that a given amount of food will produce more meat in a Durham than in either Devon, Hereford, or native; but we prefer a cross of the Holderness and native, both for beef, working-cattle, and milch-cows, though some prefer the Ayrshire for milk.

Sheep and *wool-growing* are considered profitable on mountainous locations. Cost of growing fine wool is about 42 cents per pound; cost of coarse wool, about 30 cents: large sheep are considered more profitable, both for mutton and fleece, but some wool-growers of our town give the preference to the small Merino. We have had very fine-woolled sheep that sheared from 6 to 7 lbs. each—I mean yearlings. The comparative cost of Merino and common coarse wool, is about one-third more for Merino. The number of lambs annually reared very nearly equals the number of ewes. Merinoes fall short about one-third.

The culture of roots as a field crop is extensively increasing, especially the carrot; and in our seed-markets we probably sell a hundred pounds of carrot-seed where we formerly sold one. Our report on roots must be much the same as last year. We generally raise our roots on an old tilth, as one of a rotation of crops; the land is subsoiled, heavily manured, say 45 to 50 loads well-rotted manure to the acre. Potatoes have almost entirely failed us, under all circumstances, on various soils, and under every variety of treatment.

Manures.—Our yards are constantly kept littered with straw, swamp-muck, or other refuse. Beyond all doubt, the most economical plan, and one extensively adopted for manufacturing manure, is to compost the droppings of the yard and cleanings of the stable with muck, leached ashes, or, better, unleached ashes, (as our soils, and old soils generally, are deficient in alkali,) adding plaster to fix the ammonia; but never use lime in compost with animal manures, as it sets free the ammonia, which is the life of manures —*this*, plaster fixes: to this salt should be added, the soapsuds from the wash-house, and chamber-lie from every quarter.

It is the general opinion in this section that apples are fully equal to potatoes for stock, especially for milch-cows, and we are in the habit of feeding all our apple-parings, windfalls, and most of our cider apples, to our cows, reserving only enough to make our vinegar.

The foregoing is, as near as we can come at it, a cursory statement of the statistical condition of our agricultural interests. The minutiæ of detail in the management of various crops must necessarily be much abridged in a

report of this nature. Crude as it is, we submit it to you, desiring a charitable overlooking of blunders and incongruities.

GILES B. AVERY.

Shaker Village, Columbia County, New York.

Hatfield, Hampshire County, Mass., December 18th, 1850.

Sir:—Having received one of your Agricultural Circulars, I shall endeavor to give what information I can upon the cultivation of winter wheat.

Winter wheat is cultivated only to a limited extent in New England, and especially in Massachusetts.

I believe it can be cultivated with profit on the "alluvial bottoms" of the Connecticut and other large rivers. In this town, 20 bushels per acre are considered an ordinary crop—25 and 30 quite common—and, in favorable seasons, we sometimes have 40 and 50 bushels per acre, which, being in the market, readily commands $1.25 per bushel.

Our mode of cultivation is as follows:—

After land has been cultivated for a number of years, it is frequently seeded down to clover, for the purpose of renovating it. After lying thus for one or two years, the second growth is ploughed under, generally in the month of September, and is immediately sown. It is also sown to a considerable extent after broom-corn. The broom is cut as early as possible in autumn, and the stalks, making a great quantity of vegetable matter, are buried in the soil with a plough adapted for the purpose; then, previous to sowing, the ground is rolled and harrowed, in order to make the soil as finely pulverized and compact as possible.

Seed wheat is prepared by soaking 1 or 2 days in strong solution of saltpetre, then the water is drained off, and the seed is rolled and dried with lime. This is a very effectual remedy against smut.

S. G. HUBBARD.

East Salisbury, Essex County, Mass., December, 1850.

Sir:—Agreeably to your request, by circular from the U. S. Patent Office, of 26th August, 1850, I shall try to contribute my mite.

One of our most profitable crops is hay, which, on our best fields, yields 2 tons per acre. Timothy, with a little clover, is preferred for seeding, and not more than half a bushel per acre. The cost of raising, with interest or rent of land, is $8 per ton.

Good cows are worth $30 each in the spring, and from $15 to $18 in the fall.

We consider our best breed of hogs to be the Suffolk and McKay.

Fruit culture is receiving increased attention here. Many have been planting orchards. My plan is to have plenty of roots to the trees; then dig a large hole, and, if on clayey land, fill in with sandy loam, or, if sandy, fill with well-pulverized clay-loam. I believe it is generally admitted that every tree is naturally suited to a particular soil, and in new countries we can tell what the soil is by the timber. We all know the soil of the bur-oak, the pitch-pine, beech and maple and hickory, the cedar and spruce, chestnut, hemlock, &c.; but we plant pear and apple trees wherever we like, and, if they show any

symptoms of dislike to the soil, instead of applying a remedy to the roots, we begin to doctor the branches, bark, and sap. All these, in turn, have been the subjects of treatment, but without effect. Now, let cultivators give their trees half the choice of soil that nature does her forest-trees, and the pear-blight and peach-yellows will be among the diseases of the past.

Transplanting.—Land to be set with fruit-trees should be ploughed in the fall, or very early in the spring; it should be ploughed very deep or subsoiled. When the ground is quite ready, get your trees, and set them the same day, if you can: never buy trees that have been dug over winter, and "lain by the heel;" nor plant so late in the season, as when the leaves have started: trees of this kind may live, but you lose the growth of them the first season, whereas, by the right kind of management, transplanting will hardly put them back at all. I have often planted trees which grew 4 feet the first year. Holes should be dug of sufficient width and depth to extend the roots to their original capacity. When the trees are placed in the holes, spread out the lower roots and cover them with fine earth, as also all the rest in like manner: get the roots into the earth so that they will stand interspersed, in regular system, with the soil, as the roots of a growing tree always do. The practice of thrusting the roots of a tree all in a heap, then piling on hard earth, manure, &c., and stamping it down hard, is sometimes successful, but no scientific cultivator would recommend it. After trees are set, the ground should be stirred around them while the heat of the season lasts, as often as once in 2 or 3 weeks; and if great drought should prevail, they should be occasionally watered; this should be done by making holes with a stick among the roots, and then pour on a pail of water.

Budding.—Apple-trees, and all others except plums and cherries, should be budded in September, and these should be budded in the latter part of July or the first of August; they should be put in so late that they will not grow the same season. The plan of operation is to select a shoot of the present season, with good buds, and cut off each leaf within half an inch of the leaf-stalk; then hold the shoot in the left hand, and the knife in the right, the lower part of the blade is placed on the shoot about half an inch above the bud—the thumb of the right hand rests on the shoot at the lower extremity of the bark to be removed with the bud; the knife is then drawn towards you, parallel with the shoot, smooth and level, so that the bark and a portion of the wood will be taken off. The stock to be budded should be of the present year's growth—a T should be made in the bark with the knife, and the bark raised with some convenient instrument: the bud is then inserted, and the bark is brought back and tied down over the bud, letting the leaf-stalk project out of the seam in the bark. Grafting is performed in the spring. The last of March is the proper time for plums and cherries; and April for all others. In grafting, thrifty young stocks should be preferred. The operation is simple, and consists in cutting off the stock at the point where we wish to insert the scion, and splitting the stock down the centre: the scion is cut at its lower end, in the form of a wedge, and inserted in the split in the stock: the outside bark of the scion should fit nicely the bark on the stalk. A salve made of 1 pound beeswax, 6 of rosin, melted with 1 pint linseed-oil, is then used to cover the seams made in the operation, so as to render the whole air-tight: the salve should be looked to occasionally, and kept smooth and tight on the seams, for it sometimes gets open and lets in the air, which will destroy the scion. Scions should be of the last

year's growth, and have upon each two or three buds. The cultivation of the grape is increasing here; we think that hardy native grapes might be extensively grown: I have seen 4 bushels of Isabella grapes upon a single vine; from 1000 to 1200 bushels of that variety might be produced upon an acre. There are several varieties of native grapes cultivated here, among which are the Isabella, Catawba, Sweet-water, Spanish-gray, Raisin, and Clinton. The Isabellas are considered the best. To bring the grape to perfection, into beauty, size, and flavor, the ground upon which they are set should be prepared by digging a trench 3 feet deep, and the same in width; fill it with all kinds of earth, such as sand, clay, gravel, loam, muck, and all sorts of manure, such as stable, ashes, lime, bones, forest-mould, and a little fine salt; set your vines in the trench, 8 feet apart; build a trellis 6 feet high and 8 feet long for each vine; beyond such limits they should not be allowed to extend. The vines should be well pruned, so as to allow every cluster to have the direct rays of the sun: grapes grown in the shade are generally small, watery, tasteless, and often mildewed. Vines are propagated by layers, which is done by bending down a branch of the last year's growth, and inserting the knife below a joint; the stalk is cut half off—the knife is drawn, splitting the stalk to the next joint; it is then pegged into the ground, with a hooked wooden peg, to keep it in its place, and to keep the cut open; it is then covered with earth, placing the stalk in an upright position: in 2 or 3 months it will be rooted, ready for transplanting.

Manures.—I would observe that a great saving can be effected by judiciously locating buildings, around which manure is to be made; such buildings should be so situated that all the manure that washes from them might be carried over land that requires manuring annually: a garden or yard for raising roots or fruit would be greatly beautified by receiving the drainings from the manure-yard; but the locating of buildings is only one thing in the arrangement for making and saving manure, and not to be trusted to entirely. Yards for stock should be small, and, if possible, upon hard, dry land; they should be covered, to the depth of 4 or 6 inches, with straw or muck, lime, or whatever else you can procure that will absorb the urine of stock, and hold it until spring: the same should be kept under stables for the same purpose. The manure made in fattening hogs should be collected into heaps, and be covered with bog-earth or muck. In the spring, all the yards should be cleared of all straw and other manure, which should be drawn into the fields, to be planted or sown with spring grain; it should be left in heaps till you are ready to plough; then spread the straw and unrotted manure upon the wettest land; dry straw helps such land wonderfully; it is far better than fine manure—it absorbs a great deal of water, and keeps the land loose and porous, so that an excess of water will soon dry off or run through it. Manure that is well rotted should be spread upon the driest ground, and thoroughly mixed with the soil: it should be ploughed under to a moderate depth, and then harrowed fine. If stables, barns, hog-houses, &c. are well located, and plenty of straw and muck be kept under the stables, and a plenty of that material is constantly thrown into the yards, and all cleared away early in the spring, there will be but little manure wasted. This system is far more simple, and less expensive, than to set buildings by the roadside, or upon the bank of a stream, and then go to work making drains, tanks, and pumps, to carry away the urine of the stock in a liquid state: the very thought of such reservoirs in barn-yards is

disgusting. All the straw that is made on a farm should be well stacked after threshing in the fall, and thrown into the yard a little at a time during the season of foddering; then, after soaking under the manure of your stock a few weeks, it is in a first-rate condition to plough under in the spring. Swamp-muck is a powerful manure upon old wornout ridges, or on light dry land of any kind; it is nearly as good as stable-manure. Lime is indispensable for wheat lands, if it does not abound in the soil. It should be sown annually, at the rate of 4 or 5 bushels per acre. Gypsum should be sown yearly upon all dry soils, at the rate of 2 bushels per acre. Guano is not used in this part of the country. The plan of fencing with wire is beginning to receive some attention, and bids fair to supersede the use of crooked rail-fence; it has one advantage over hedges, for we need not wait 4 or 5 years for it to grow. Wire for fencing can be bought for 7 cents per pound; the posts may be set from 4 to 6 rods apart; the whole cost of materials for making a substantial wire-fence will not exceed 60 cents to the rod. It is thought that galvanized wire will last a long time.

I must submit my production to your discretion, and you can use the whole or a part, as will best comport with your ideas of the public interest.

I am, sir, yours truly,

GERSHOM WIBORN.

P. S.—I am entitled to a Patent Office Report for last year; please send me one. I would thankfully receive any rare specimens of grain for trial that you may have for distribution. I would give them a trial, and report my success.

G. W.

Portland, Chautauque County, New York,
November 7th, 1850.

Sir:—In reply to your circular requesting information on the various branches of agriculture, I submit the following, which it seems necessary to premise by stating, that the soil and climate of this county are very diversified. The northern part, extending from lake Erie to the dividing ridge, which separates the waters which flow into the lake from those which flow into the Alleghany River, embracing a section three or four miles wide, has a soil and climate very different from that part of the county extending south of the dividing ridge to the State of Pennsylvania. The high lands are rolling, the hillsides of gentle slope, and well watered by numerous springs and small streams, and the soil well adapted to grazing.

The northern part of the county is adapted to the raising of grain, and all the varieties of fruit which are cultivated in any part of the State. The climate is much milder than in the more southern and higher sections; generally but little snow or extremely cold weather, and early and late frosts seldom injure vegetation.

Agricultural Improvements.—There has been for many years a very perceptible change for the better in all branches of agricultural pursuits; while a better system of tillage is practised by those who raise grain, and much labor saved by the use of ploughs, harrows, cultivators, reapers, and other improved farming utensils. Thus the land is better worked, and at less expense than formerly. Those engaged in the dairy business have generally obtained the best apparatus therefor, by which means the labor

is performed with greater facility, and a better article produced than was formerly the case.

A county agricultural society was organized in 1836, and the annual fairs are usually very interesting. The exhibition of stock this year was equal, if not superior to that of any preceding year.

Winter wheat is one of the principal crops in the northern part of the county; and most of the lands in that section produce it well. It is also raised to some extent in the southern part of the county, near Chautauque Lake and its outlet. The quality of the wheat raised is equal to that grown in any other part of the State; the product per acre depends upon the culture and soil. Crops of from 40 to 50 bushels to the acre have been raised, but much of the best wheat land has been, and now is, cropped for many years in succession with wheat or wheat and corn, without manure, until the fertility of the land is greatly impaired. I think the average product will not exceed 18 or 20 bushels. Very little land is prepared for wheat by summer-fallowing. It is generally sown after a crop of oats, barley, spring wheat, or corn, the land being ploughed but once after the preceding crop.

The practice of ploughing pasture and meadow in the fall, and sowing wheat with but one ploughing, has succeeded well. From the 1st to the 20th September is considered the best time for sowing wheat; but as much is sown after a crop of corn is taken off, it is necessarily sown later, even until the ground freezes.

Of varieties, the white flint, Soules, Mediterranean, red-chaff, and blue-stem white wheat are all raised more or less. The white flint and Soules have generally succeeded well. The product of the Mediterranean is small, and not so much is raised now as formerly. The blue-stem white wheat is the product of a small parcel sent here from the Patent Office, in the autumn of 1843, and has thus far succeeded better than any other variety. The quality of the grain is very fine, and in most cases, when sown by the side of other varieties, with soil and culture equal, it has exceeded them in product, and not been injured by the rust or fly when the other varieties have. The product of that small parcel has been sown in Vermont, Canada, Wisconsin, and many counties in this State, this fall. That sown last year in this State and Canada succeeded well, so far as I have heard, and should the product of that now sown be as good as that of former years, it will soon be the most common variety raised. When sown broadcast, from 1½ to 2 bushels is the quantity usually sown per acre. This fall, considerable has been sown with drills, at the rate of 1 or 1¼ bushel per acre, and another season will decide which is the best method of sowing.

Spring wheat is sown to considerable extent in all parts of this county. The product, however, is not so great as of winter wheat; but is better in the southern than in the northern part. The tea, Italian, red-chaff, and Black Sea are the varieties grown. Of these, the last named is usually considered the best, and is less liable to rust and fly than the other varieties. Average product, 12 to 14 bushels per acre; although sometimes crops of 25 or 30 bushels have been raised. The product is diminished greatly by the rust, fly, and very warm weather at a certain stage of its growth, which renders it a more uncertain crop than winter wheat. Both winter and spring wheat are limed before sowing, which, when thoroughly done, prevents smut. Blue vitriol is also considered a preventive.

Hessian-fly.—I have heard of no remedy for the Hessian-fly that could be generally practised; but late sowing is considered safest as respects in-

jury from them in the fall. I think that the hard straw of some varieties makes them less liable to injury than others of common straw.

Corn is raised in all sections of this county, and the crop is generally good; but in the southern part it is sometimes injured by frost: for the last few years, however, the crop in that section has been good. The northern part of our county is considered equal, if not superior, to any other section of the State for corn. It grows well on any land that can be ploughed. The usual mode of cultivation is to plough sward or stubble once, and harrow it well before planting; the usual time of which is from 1st to 20th of May. The steel-teeth cultivator is used by many in dressing and weeding it, and very few hill the corn, as formerly. Early planted corn is usually hoed or dressed twice; but most of the late planted (and some of the early, where the land is clean) is hoed but once.

There are many varieties raised, and all produce well. Some prefer one kind, and some another. On good, fertile land, without manure, 50 to 60 bushels per acre are not an uncommon yield; and 110 bushels have been raised on an acre. The probable average, in the northern part, is 40 bushels per acre. When fed to cattle, it is generally ground with the cob, and considered thus better feed for them than if ground without it. Very few grind corn for hogs, but feed it in the ear. I have no doubt that a less quantity, when ground and boiled, is required to fatten hogs; but I am aware of no experiments to show which is the cheapest, taking into consideration the price of corn and the expense of grinding and preparing it. The corn is cut up when ripe enough, and the stalks and shucks saved for fodder.

Broom corn is raised to considerable extent, and the culture of it is increasing. From 500 to 600 pounds of the brush, and from 40 to 60 bushels of seed have been raised on an acre, and are not considered an uncommon crop. It is manufactured into brooms by those who raise it.

Oats, in the southern part of the county, are considered a profitable crop, and are grown to considerable extent; averaging 40 bushels per acre. In the northern part they are not much raised, the climate being too warm and dry for them, the average product not exceeding 25 bushels per acre.

Barley and *rye* but little raised.

Peas were formerly grown as a field crop; but the bugs injured them so much that few are now sown, except in gardens.

Manures.—Barn-yard and stable manures are principally used; but plaster, lime, and ashes, leached and unleached, are used by many with much success. Plaster and ashes would be used more if the expense was not so great. The stone for both plaster and lime is brought from Canada. Buckwheat and clover are sometimes ploughed in to manure the land. Coarse, unrotted manure is applied in spring, and ploughed under. When applied to wheat, it is spread before sowing, and harrowed in with the wheat. Lime, plaster, and ashes are very beneficial; but lands that have been exhausted by constant cultivation without manure, can be restored to their former productiveness by a thorough application of barn-yard manure, and by deep ploughing. Gravelly and loamy soils are ploughed deeper than formerly; subsoil ploughing has not been tested sufficiently to ascertain its results.

Clover and Grass.—Clover is generally sown on grain, and on lands seeded for permanent meadow or pasture. It is usually mixed with timothy, which is the principal meadow-grass, but, on moist lands, the red-top grows apparently spontaneously, after the land has been seeded a year or two with timothy. Hay is worth from $5 to $6 a ton, when the crop is fair. The

quantity cut per acre varies from 1 to 2 tons. The expense of cutting and making hay is much less now than formerly. Where the meadows are smooth, revolving horse-rakes are used, and a more efficient labor-saving machine for farmers never was invented.

Dairy Husbandry.—The high lands of this county are considered equal to any section of the State for dairying. This is the best business pursued by farmers, and has increased very much within a few years past. The income varies, according to the quality of the cows and the skill employed. While the product of some amounts to $35 per cow, others fall far short of this, and the average will not, probably, exceed $25 per cow. The butter and cheese made in this county stand, deservedly, high in the market.

As the dairy business has increased, the raising of stock has diminished. The Durhams and Devonshires, or a cross of these with native, are the most common. Much interest has been manifested in raising the best of stock, and many of our enterprising farmers have imported the most valuable pure-blooded animals to be found in the Eastern States.

Sheep husbandry was, a few years since, a very extensive branch of farming in this section, but, from the low price of wool and the dairy business being more profitable, wool-growing has decreased, so that comparatively little attention is now paid to the business. There are, however, some very superior flocks of Merinoes, and most of the sheep of the county are of a fine grade.

Fruit Culture.—The cultivation of fruit has received much attention for many years. Apples are raised in all sections of the county, and most orchards have a good assortment of the best varieties of early and late or winter apples. That portion of our county near Lake Erie is well adapted to the cultivation of almost all varieties of fruit. Apples, pears, peaches, quinces, plums, cherries, apricots, and grapes, are cultivated, and of these we have most of the varieties considered the best. Pears have been much injured by the blight for some years past, but the early and late varieties do not appear to be as much affected by it as the others. The Isabella and Catawba grapes produce well, and with but little attention. Those which are trained into the tops of fruit-trees and extend a great distance, flourish and bear well, with but little pruning. Buffalo is the only market for grapes, where they are sold, in large quantities, at 4 to 6 cents per pound, and the culture of them is increasing. Our market for apples is poor, there being so many raised in the county; and the cost of transportation to Buffalo is so great that the price here is usually low. This fall, the best of winter apples were sold, at the orchard, for 12½ cents per bushel. They are considered good feed for hogs, and great quantities are thus consumed. Previous to the potato-rot, many farmers practised boiling potatoes and apples together for hogs; but since the rot has so diminished the crop of potatoes that not enough are raised to feed to hogs, it has been ascertained that hogs thrive as well on mellow apples as on any other feed, except corn, which is considered the best when well advanced in fattening. Sweet apples are better for hogs than sour; and many are of opinion that an orchard of sweet apples would be very profitable for fattening hogs.

I would here remark, in regard to the crops the present year, that the wheat crop was not more than an average one; the dry weather in May injured it considerably, but it was very promising up to that time. The corn crop is good—fully equal to last year. Hay was injured by the dry weather, and will not, probably, average more than two-thirds the crop of

last year; but corn-fodder and straw are well saved, in good condition, which will, in a great measure, supply the deficiency; and the feed being good this fall, with uncommon warm weather, foddering will not commence as early as usual.

Yours, respectfully,

TIMOTHY JUDSON.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Doylestown, Bucks County, Pennsylvania, November, 1850.

Sir:—I received your circular some time since; and it gives me pleasure to answer, so far as I am able, the inquiries therein proposed. I do not flatter myself, however, that I can add much to your knowledge on the subjects referred to; but if the information I send will enable you to select a single grain of wheat from the chaff, I shall feel well repaid for my labor.

Permit me to say that the Patent Office Reports are yearly exciting increased attention among our farmers, and are much sought after, and perused with an interest which gives strong evidence of their intrinsic value.

Wheat.—The varieties of wheat that have been cultivated in Bucks and the adjoining counties, for several years past, are very numerous, and the success various, depending somewhat upon the seasons; but, from the experience of the last harvest, public opinion has settled down very decidedly in favor of that known as the Mediterranean, the product being larger and the quality superior to any other variety grown the past season. The average produce at the last harvest would, I think, fully reach 20 bushels per acre; time of sowing this variety, from 5th to 25th September; of harvesting, from 1st to 10th July, in ordinary seasons; the seed generally sown without steeping, or any other preparation; quantity of seed, 1½ bushel per acre—rather less when drilled in. As a general rule, the ground is ploughed 3 times for wheat; the first and second ploughings tolerably deep, say from 4 to 6 inches; and the last ploughing not so deep, forming a ridge furrow, by which the grain is thrown into rows, and has the appearance when grown of having been drilled in. The use of the drill is yearly becoming more common, and, I think, with advantage.

In this section of the country, the quantity, not only of wheat, but of other grains and grasses, is rapidly increasing, and has no doubt been doubled in the last 15 or 20 years, and is, at this time, increasing faster than at any former period. The common rotation of crops, commencing with a grass sward, is, first corn, then oats or barley, (seldom the latter,) and the same summer, after the oat crop, the land is prepared with lime and stable-manure for wheat; it is then sown with grass-seeds, generally in March or April following. The timothy-seed is frequently sown immediately after the wheat, with the best chance of success; but the wheat is sometimes injured at harvest, by the strong growth of the timothy, particularly on low and moist lands.

The Hessian-fly is the greatest scourge we have to contend with, and no specific remedy has as yet been discovered. Strong manuring is the best we know; but much depends upon the weather during the month of April and the early part of May: if that season is cold and wet, little injury is

done; if, on the other hand, it is warm and dry, the crop is not only injured but in a measure destroyed by that pernicious insect. The Mediterranean and other early varieties were very little injured by the weevil at harvest; but whether they will injure it in the sheaf, previous to threshing, we have yet to ascertain. The price, since the beginning of 1850, will average about $1.20 per bushel, and seems to be declining since harvest, from the abundance of the crop and the fulness of the supply in Europe.

Corn.—It is somewhat difficult to describe the different varieties of corn, and fix precise values on each—one rule is applicable to the North, and another to the South, depending mainly upon the length of season. The small flint corn would be comparatively unproductive at the South; and the large-eared and grained Southern corn would be equally so at the North, as it would not attain perfection before a frost. The most esteemed variety with us, and in the Middle States generally, is that with the largest grain that will come to full maturity in our climate; and this a medium between the large Southern and the small Northern flint corn, having a large, heavy, smooth grain, without indentation. The average yield, in a series of years, would probably range from 40 to 50 bushels; but 60 or 70 bushels are sometimes reached by our best farmers, in good seasons. In estimating the cost of production, I could hardly expect to approximate the truth. I think it is, however, for the labor bestowed on its production, as profitable as any other grain, and its aggregate value in the whole Union, very nearly, if not quite, equal to all other grains cultivated.

The system of culture varies much in different sections of the country, and possibly with advantage in each. With us in Eastern Pennsylvania, it comes in rotation after the ground has been laid down in grass for 2 or 3 years, and used for mowing or pasturage. The sod is turned down as early in the spring as practicable, and, at the proper season, repeatedly harrowed, until the surface is made quite smooth and mellow. It is then cross-furrowed on the surface, without disturbing the sward underneath, so as to form hills at equal distances, and usually planted from 1st to 20th May. In many instances, it is manured in the hill previous to planting, either with unleached ashes or rich earth, combined and prepared for that purpose, and deposited in the hill before planting the corn, and the farmer is well repaid for the additional labor and toil. A week or 10 days after it appears above the ground, plaster is sprinkled over the hills, in moist weather, and after that time the cultivator is mainly used in keeping the ground loose and free from grass and weeds. It is generally fed to hogs whole, the refuse or soft grain being first used, and answers the purpose of fattening well. For stall-feeding cattle through the winter, it is almost invariably ground, and not unfrequently the corn and cob are ground together, without shelling. The quantity of manure made by hogs is small, the quality, however, is rich: our hogs are seldom confined to the pen, except during the fattening season, and then but for a few weeks. In regard to the amount of manure made by hogs fed upon a given quantity of corn, no definite answer can be given. I can only express the opinion that, if mixed with rich earth, and a small portion put into each hill before planting, it would greatly increase the crop and amply repay the farmer for the extra labor required.

Clover and Grass.—Our principal grass crop is raised upon upland, and the seeds of clover, timothy, and herdsgrass are sown upon wheat and rye, following the regular rotation of these crops with mowing ground or pasturage for 2 or 3 years in succession. We have also our natural meadows,

which are but seldom ploughed, and which, by irrigation and occasional top-dressing, with short manure, are made very productive not only for hay, but, in autumn, for the best pasturage. By top-dressing, our meadows are made to produce a fine sward of natural grass, which is equal, if not superior to any other, both for hay and pasture, in producing milk and butter.

The average of hay per acre on upland, in favorable seasons, is about 2 tons. When meadows are ploughed, (which is seldom,) they are generally laid down with timothy and herdsgrass: the quantity of seed to the acre I can hardly specify; but there is little danger of getting too much. Of clover and timothy, 1 bushel of each for every 6 or 8 acres of upland, is about the quantity required.

Dairy Husbandry.—Much attention has been paid to this branch of industry in the vicinity of Philadelphia, and the yearly increase of the product of butter is an evidence that it is profitable to those engaged in it. I believe I am safe in saying, and the fact will be conceded by every one who has visited the different portions of this country, or even of Europe, that Philadelphia butter stands unrivalled at all seasons of the year for its excellence. This market is chiefly supplied from Bucks, Montgomery, Chester, and Delaware counties; all in the immediate vicinity of Philadelphia. But little cheese is made in these counties, and the cost per pound I cannot give of either. The price of butter varies considerably in the Philadelphia market at different seasons, but a fair average for the whole year, would be from 20 to 25 cents per pound; and a large proportion of all made in the aforesaid counties is sold in pound lumps from market-wagons and stalls.

Neat Cattle.—There are comparatively few cattle raised in Bucks county, the calves being generally sold for veal when from 4 to 6 weeks old, and their places supplied by purchase of stock 3 or 4 years old from New York, New Jersey, Ohio, and the western part of Pennsylvania.

The raising of *sheep* is not much attended to, and the wool grown is principally for domestic use of farmers in their own families.

But few *hogs* are raised and fattened more than are required for our own tables. The curing of hams and bacon has undergone a great change within a few years, by combining a portion of sugar and saltpetre with the salt, and putting them down with what we term *sweet pickle*, a valuable discovery, which gives a fine flavor to the hams.

Root Crops.—The Irish potato only is cultivated to any extent: the exact expense of raising, per bushel, is difficult to ascertain. The yield varies with the season; 200 bushels have been raised, under the most favorable circumstances, on an acre; but the average is less than half that quantity. The white Mercer is considered the best variety. They are planted in rows, about 3 feet apart, being deposited at intervals of 10 or 12 inches on the manure, which has been placed in the furrows. The free use of lime and plaster will much increase the crop: but the main secret of producing large crops is the plentiful use of short manure on a tolerably dry soil, and cultivating frequently early in the season. No additional earth should be placed around the stalk after the blossom appears, or a new set of tubers will be thrown out, which may increase the number, but will diminish the size of the potatoes. Large quantities have, the present year, been destroyed by rot, and no effectual remedy has been discovered.

Fruit Culture.—More attention is now paid to the cultivation of fruit and the selection of the best varieties than formerly. Apples are whole-

some, and convenient for family use, but could not be made a source of much profit in this section. The early droppings of the orchard are valuable food for hogs, as they serve to put them in a healthy and thriving condition before the season for fattening commences. The same remark will apply to the use of potatoes and pumpkins. The blight seldom attacks our apple or pear trees. For the "yellows" in peach-trees, I know of no remedy but setting out trees every year, and thus keeping up a succession of crops. I prefer budding to grafting for choice fruit; in transplanting, they always succeed when done at the ordinary season in spring. Grapes are raised in great perfection for the use of the table. Most of the foreign varieties succeed, and are a luscious and delightful fruit in their season. They are principally cultivated in gardens, and answer well for arbors in the vicinity of dwellings, both for fruit and shade.

Manures.—There is scarcely any subject that more engages the attention of farmers than that of manures, and none on which there is a greater variety of crude opinions, without any precise facts or experiments to sustain them. When we shall have discovered the *pabulum*, or appropriate food of plants, in their various stages of growth, we shall have the foundation on which to erect theories, and verify them by direct experiments. The merest *tyro* in farming knows that the application of many substances stimulates the growth and perfection of plants; but, if asked by what means, and through what agency these substances are conveyed to the growing plant, he, in common with myself, would be unable to answer. We all know that heat, air, light, and moisture are necessary to the proper growth and perfection of all cultivated plants, and that the absence of any one of these is fatal to their natural and full development; but what the action of any, or the combined action of all these, is upon the healthy growth of a plant, we do not as yet understand. That the principal sustenance and increasing growth depend upon the absorption by the roots and transmission through the stalk or stem to the extremities of the branches and leaves, is undoubtedly true, but we question whether this is the only channel whence nourishment is derived.

The beautiful theory, at one time generally admitted, that a wise and bountiful Providence has provided the vegetable kingdom as the great absorbent of the deleterious portions of our atmosphere—it giving out only such as are favorable to health and comfort, thus at the same time nourishing the vegetable kingdom and purifying the air we breathe—though probably true, as a general theory, requires to be received with some limitations. The limits of a reply to your inquiries on the subject of manures will scarcely allow me to go into detail, or extend my remarks further on this subject.

Very respectfully, yours, &c.

WILLIAM CARR.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Arkport, Steuben County, N. Y., December 20th, 1850.

Hon. THOMAS EWBANK, *Commissioner of Patents.*

Dear Sir:—Your circular, requesting agricultural information, was duly received, through the politeness of Hon. D. Rumsey, Jr. I regret, exceedingly, that I am not able to give you a more detailed account of the interests of agriculture in Steuben county. We labor under the disadvantage of having no county agricultural society. I believe there was one established in this county several years ago, but, from some cause, (to me unknown,) it has long since "gone to that bourne whence no traveller returns."

Wheat.—The crop of wheat harvested this season was much more than an average one, and the quality would have been remarkably good had it not been for the heavy rains to which it was exposed in the process of harvesting—which commenced here about the 20th of July; and what was got in previous to the 25th (about one-tenth of the whole) was in fine order. It then rained for 15 days in succession, and consequently the greater part of the wheat crop was more or less grown—some fields almost worthless. The "Hutchinson" wheat has been preferred to all other kinds; but, for the past two or three years, it has found a successful competitor in a variety known here as the "Soules" wheat. It is the general opinion, among our best wheat-growers, that the latter will yield, on an average, 5 bushels more per acre than any other variety known. Average product, about 20 bushels per acre. We seed from the 25th of August to the 20th of September; soak the seed in strong brine for 12 hours, and then add half a bushel of unslaked lime to 10 bushels of wheat—mix thoroughly—let it lie over night and sow in the morning, from 1½ to 2 bushels per acre; the latter quantity preferable. The land is generally summer fallowed in June, turning under a good coat of clover. Plough about 6 inches deep, and cross just before seeding; sow on the furrow, and harrow thoroughly. Drills are not much in use about here. The yield per acre is increasing. We are not troubled with the "Hessian-fly" or "weevil." Average price, at our nearest market, (Dansville, Livingston Co.,) for the year 1850, is 94 cents per bushel; although, by getting it floured, and disposing of it to the workmen on the New York and Erie Railroad, at our own doors, we get something over that—$5 per barrel.

Corn.—This most important farm crop, and one that has been too much overlooked by the most of our farmers, is receiving the attention of many who have heretofore entirely under-estimated its value and its importance as a farm crop. The different varieties are, the early gourd, and the 8, 10, and 12-rowed yellow Dutton corn; the latter will yield from 5 to 10 bushels more per acre, and, when the season is favorable for ripening, is much preferred. Average product per acre, about 50 bushels. We harvested this fall, from one field of 9 acres, which was so badly injured by the worms that in June we thought it hardly worth hoeing, 1200 bushels of ears, which would make about 500 of shelled corn. The method we most approve is to plant on sward ground, ploughing it but once, and turning under all the manure we make during the winter; then harrowing, lengthwise of the furrow, until a good tilth is produced. Mark it, 3½ feet each way, and plant about the 10th of May. As soon as the corn is up, (say 5 or 6 inches,) start the cultivator, and have a boy follow, to see that there is none covered. Immediately after, put half a handful of unleached ashes on each hill. In about two or three weeks, we again go through with the cultivator, twice in

a row each way, and follow with a hoe, giving a thorough dressing, throwing a little fresh dirt round the plants—but no hilling. This is all that is required until the kernel is sufficiently glazed to cut up. We then put 25 hills together, binding firmly round the top with stalks—husk in October. Cost of production, as follows:—

Interest on land, per acre	$5.00
Ploughing, once	2.00
Harrowing	1.00
Seed, marking, and planting	1.00
Ashes, and putting on the hill	50
Cultivating	2.00
Hoeing, once	1.00
Cutting up	75
Husking and threshing	3.00
Seeming stalks	50
	$16.75

Average yield, 50 bushels; cost of production, 33 cents. In this estimate I have made no account of the manure, because the stalks are worth (well-housed) $5 per acre, to feed stock; besides adding materially to the next year's supply of manure for another crop. The home, with us, is much better than the foreign market. We generally sell at our barns, in the spring, for 62½ cents per bushel.

Oats.—This crop generally follows corn; sow about 3 bushels per acre. We consider it the most exhausting to the soil of any crop we raise. Still it is cultivated very extensively. Average yield, about 60 bushels per acre; worth from 30 to 50 cents per bushel.

Barley.—But little sown; does not do well on our soils; very liable to rust; worth from 60 to 75 cents per bushel. Peas and beans are cultivated only for our own use.

Clover and Grasses.—The quantity of hay cut per acre, in good seasons, will average about 2 tons. We generally seed after oats or wheat, about 5 quarts of clover, (the small kinds,) and 2 of timothy; sow plaster annually on meadows, half bushel to the acre. Hay is worth at the present time, $10 per ton.

Neat Cattle.—Our young cattle, after the first year, are usually wintered on coarse feed—straw, cornstalks, &c., with hay in the spring, till they are 3 years old; they are then worth from $15 to $20. Good dairy cows are worth from $25 to $30 in the spring, and, in the fall, from $12 to $18.

Sheep and Wool.—Wool-growing is not considered very profitable; the average weight of fleece is thought, by good judges, to be about 3 pounds; the price has ranged from 30 to 44 cents, according to fineness of fleece: average, say 36 cents; mutton is worth 2 and 3 cents per pound. Pelts, from 75 cents to $1.

Potatoes.—The potato crop has proved a very light yield, and the disease has prevailed to a very alarming extent; the best remedy yet discovered by us for the rot is to plant healthy tubers on well-prepared dry, but not gravelly soil, as early as the season will admit; harvest early, and keep them dry, but not warm.

I have thus hastily glanced at a few of the topics suggested in your circular, with which I am familiar.

I feel a deep interest in the Reports from your office, and think they are the means of furnishing much useful information, especially to the agricultural part of the community, and shall be highly gratified, should the above be of any service to the Commissioner of Patents, in making out his annual report.

Respectfully yours,

JOHN HURLBUT.

Cumberland County, Virginia, September 17th, 1850.

Sir:—Agriculture in this region is in a state of transition. By injudicious modes of cultivation, our lands are much deteriorated, and large quantities nearly ruined. We are generally convinced that they must be improved or abandoned. We find our *patient* in a desperate condition, and conclude that something must be done, and are ready to resort to any experiment, however wild. As necessity stimulates invention, we may in this way occasionally discover something valuable, and eventually adopt a systematic course well adapted to our circumstances. Much useless expenditure has been incurred by sowing clover-seed and plaster on lands utterly incapable of producing clover without an application of nutritious manures. Much loss has been sustained by laboriously cultivating lands too wet to produce any valuable crop without thorough draining. Our manures are often rendered nearly inert by exposure to rains, which wash out the soluble portions, and produce chemical decomposition so rapidly as to evaporate their most valuable elements previous to their application. Many of our animals die, too, from want of proper protection from bad weather. These, and many other obstacles to successful agriculture, must be carefully guarded against, before we can emerge from the difficulties that surround us, and place our fine country in that rank of improvement and value of which it is so highly capable. I have often heard despondent remarks regarding the capabilities of the soil in this region for improvement, at least until the far West shall be fully peopled. From these lugubrious croakings I most deeply, and almost indignantly, dissent. I can personally bear witness to many instances of profitable improvement, rising annually before my eyes. A kind Providence has adapted each portion of our great country to fill its place in a grand and glorious Union, if each portion will but be content to strive to remove *its own* evils, and patiently await, however slow, the unerring progress of national improvement. This is progression for which all should labor.

Wheat stands deservedly at the head of your agricultural inquiries. There are so many who appear to sow wheat simply to make straw—often failing even in that—on poor corn land, that it is very difficult to form even a surmise as to the average crop. Our climate being so variable, forms another difficulty in estimating the average quantity produced, even by those who sow on lands capable of yielding wheat. Leaving the *straw-makers* out of the account, I suppose that 10 bushels per acre might be set down as our average product; for though our best lands, rich tobacco-lots and fallow-grounds, in our best wheat years, go up to 30 bushels, and, in some rare instances, to 40; yet, in unfavorable seasons, the average often falls below 10. And besides, much of our land, which may be called rich,

is deficient in those elements necessary to produce good wheat, while they yield largely in tobacco and some other crops.

And now the question arises, how shall we increase the average products of our lands in wheat? Space is denied for a full discussion; but a few remarks in reply may be allowed. We must plough deep, and thoroughly pulverize the soil. Those elements necessary for the formation of wheat, which are wanting in the soil, must be supplied. We are denied the free use of lime; but we may use it to a limited extent. Three or four bushels of lime put on with rich stable manure, in which the volatile gases have been fixed by means of gypsum and common salt, must do good by combining with the phosphoric and other acids in the manure. It is admitted that lime, applied to manure, not previously guarded by a suitable acid or salt, will cause a disengagement of ammonia; but if the sulphuric acid in gypsum will absorb the ammonia, I should hardly think a further addition of lime would cause a separation. Some of the chemical salts manufactured in our cities are believed to be worthy of trial. Kettlewell and Davidson's renovator, made in Baltimore, is becoming popular, and I expect to sow wheat this fall, on lands where 70 barrels of this fertilizer have been applied. Several of my neighbors will also try it—one of them largely. Guano certainly, in some instances, increases the quantity of grain and straw; but that the money expended on its purchase invariably affords a profitable return, is, I think, yet to be proved. I have seen failures after the careful use of what was doubtless the genuine article. Whatever manure may be applied, it is important that the utmost care be taken in draining off the redundant water. This should be done to guard against *rust*, which I consider the greatest drawback on our production of wheat. We had, this year, during the last half of May and until late in June, very dry and hot weather, which seemed to parch up instead of ripening our wheat crop. Notwithstanding this severe drought, we suffered more from rust than for many years before. I ascribe this to the excessive rains which fell before the drought, leaving stagnant water upon the land, which, by its putrefaction, poisoned the crop, and caused the rust. For the last 10 days, we have had, perhaps, the coolest weather ever known, for the season, with the ground tolerably dry; yet the tobacco is fearfully firing. This, I think, arises from the same cause as rust in wheat, for we had, some time ago, the heaviest falls of rain that I have ever witnessed. Firing in tobacco and rust in wheat seldom appear until these crops approach maturity.

The time of sowing should depend much upon the variety of seed. Late kinds should be sown about the 20th September. The seeding of earlier varieties may be deferred a month later. I made several experiments of sowing in August; but lost much of the crop from the fly. Many of our best farmers think from 10th to 20th October the best time to sow, to escape the fly. When smut was common, we soaked our seed wheat in a solution of salt, skimming off light grains, spelt, and other seeds of noxious plants, and rolled our seed in lime before sowing. I have heard nothing of smut for many years, and very few now make any further preparation of seed than to clean it. From 1 to 1½ bushel is the quantity usually sown per acre.

Land that has been cultivated the preceding summer in tobacco or any other hoed crop need be ploughed but once for wheat. It is better, in order to destroy noxious weeds, to plough under a clover or grass-fallow before their seeds ripen in early summer, and to refallow in the fall, before sowing wheat. But most of those who operate on such fallows plough but

once, and then get in their seed with what we call a big rake—a large kind of harrow, with 20 or more straight teeth. I prefer the harrow or cultivator, with 7 long and broad-pointed teeth, as, in using the rake too large, a portion of the grain is left uncovered. I like to cover seed wheat at least 2 inches deep. We plough much deeper and use better implements than we formerly did. In place of a little, scratching, 1-horse trowel hoe, we now use 2 and 3-horse ploughs, of various models, cutting from 6 to 10 inches deep. There was, at first, a great outcry against deep ploughing, as burying the soil too deep for return; but it is found to make soil of the whole tilth, and the benefits are too manifest to all who will look, and believe their eyes, to admit of question.

It is difficult to say whether the yield per acre is increasing or diminishing. While the country abounded in forest, the system of culture and, consequently, the product, was more uniform than now. Then all cut down their woods, cultivated their land a few years, and, as soon as it began to fail in fertility, turned it out as old fields, and cut down more woodland. Those who had no more woods to cut down, began to save and apply manure to tobacco lots. The average of other crops began to lessen, until necessity drove many to new countries, others to struggling in ignorance against their hard fate, and some few to earnest endeavors to improve our condition. We have cut nearly all the forest that we dare cut, and are now divided into various classes. Some make less wheat and less straw every year, giving all their manure to standing tobacco lots. Others move their lots every year, to "extend the area" of fertility, and reserve a part of their manure for other crops besides tobacco, sowing clover and plaster, and resorting to every practicable means to improve their lands. Many of these are greatly increasing their crops, and serve as examples and teachers of the rest, who, it must be confessed, are slow to learn. Those who cultivate no tobacco, and are directing all their energies to the general improvement of their land, are too few in number to form a class. In this category, for the present, stands the writer, quite confident that this is the most speedy way of renovating the face of the country;, but sadly doubting whether the individuals who adopt it may not be lost in the mazes of an intricate and untried way, without the guidance of common custom around them to enlighten their path.

We have no uniform system of rotation in crops. Individuals are striving to strike out new plans of their own, adapted to their peculiar circumstances. So far as there is any established system, I think the four-shift rotation of the late John Taylor, of Caroline, the most common. The following is my own plan:—I cultivate corn only upon low grounds; the surface to be smoothed at the last working, for sowing clover-seed, and the clover to be fallowed the next fall, for seeding wheat. I prefer that corn should grow after wheat than after clover, to avoid the clover worm; and I think wheat grows better after clover than after corn. My high land is alternated in clover or peas, and small grain; wheat being sown on the richer and oats on the poor land. Should the price of wheat keep up to a dollar per bushel, and my faith not fail in the efficacy of manure for increasing the average yield, I may be able to get along in this way. I had to begin, however, with most of the high land in a state of great sterility. I do not think our high lands can bear so exhausting a crop as corn oftener than once in 6 or 8 years, and the land should be heavily manured even then, and much less of it tended.

I know no remedy, not already published, against the Hessian-fly. Early threshing and bulking will, doubtless, prevent the egg of the moth weevil from hatching in the wheat; and fumigating the granary thoroughly with burning sulphur is said to expel the black weevil.

Corn.—There are many esteemed varieties of this noble grain, among which, perhaps, the old Tuscarora and Dearing stand foremost for this region. Hardly two persons can be found who would agree as to the average product per acre. There are extensive tracts of land so extremely poor as not to produce a single ear, unless favored with a genial season. It is difficult to divine why such land should be cultivated at all. A man, judicious in other matters will sometimes cultivate 100 acres in corn, 25 or 30 of which will produce all the crop he makes. Those whom we consider good farmers obtain from 4 to 6 barrels of corn per acre.

The system of culture depends upon the season. I always wish to avoid breaking the corn roots, but, when the grass has grown rapidly during a rainy season, it cannot be killed by the cultivator, and a turning-plough must be used, especially in stiff land. The earth should be completely turned up and pulverized before planting. After this, if the land be light, the big horse-rake, with its front teeth drawn out, may be dragged over the young corn, which should immediately be dressed with hand-rakes, with large spike-nails for teeth. In stiff lands, hoes should be used for dressing the young plants, followed by a mould-board plough, turning the earth first from, and then directly towards the corn. The after culture of the crop may then be trusted to the hoe and cultivator. The chief labor on the corn crop should be applied on its preparation. If the land be rich, it should not be planted until the first half of May. The ground is then much better prepared, the young corn not being in the way. Many good managers plant in March and early in April; but, in that case, the young plants are stunted and discolored by much chilly weather in early spring, and I think never fully recover. If not planted until the ground begins to be warm in May, their growth is vigorous, and they derive the full benefit of hot weather, as well as being in a better state to receive the late rains which often succeed a drought. Poor and low lands require earlier planting.

The *cow-pea* is attracting considerable attention. It has, however, so recently been introduced, that there is need of some caution in its praises. From four years' experience, I am greatly pleased with it as a green crop. It renders an early summer ploughing necessary, which, if early enough, turns under the young spelt, wild carrot, ribwort, wild onion, and other noxious weeds, before their seeds mature; and if there remain a few, they are much smothered by the rank luxuriance of the pea-vines. These vegetable pests are more successfully opposed by a smothering crop than by any other means which I have observed. I have never known the wild onion yield so much to any treatment as to turning it under early in June, when it is in blossom.

Enough has been said of the pea as an antidote against vegetable pests; its value as a cleansing crop cannot be doubted. It remains to speak of it as a fertilizer. I am old enough to have learned, from those long since dead, much about the first settlement of this part of Virginia. Some of them told me that the forests were so thickly covered with wild pea-vines, running up the trees and bushes, that a man on horseback could not be seen in many places at ten feet distance. That on some of our ridges, now esteemed the poorest sort of land, then chosen as the most productive, the

decayed vegetable matter laid in such a stratum, all over the woods, that a man could run his foot into it knee-deep, with facility. That cattle could be transported in droves from the Carolinas and Georgia to Philadelphia and Baltimore, without feeding, except on the wild pea-vines, until they approached the thick settlements—and fattened all the way. The traveller or hunter reposed on a couch of Nature's spreading, while his horse, tethered by a short cord, luxuriated on more pea-vines within his reach, than he could destroy. I know not what kind of wild peas were then most abundant. In my boyhood, there were many varieties not to be found now. The most luxuriant grew on the trees, to the height of 25 or 30 feet, but they were very scarce. They had perennial tuberose roots, resembling sweet potatoes, and bore, near their tops, enormous clusters of pods, containing very pretty peas, of medium size. I have seen none of these for many years. There are still many smaller varieties, one of which climbs 8 or 10 feet on weeds and bushes, in rich lands. The custom of allowing stock to roam at large has, however, nearly exterminated them. Their decay formerly, in the opinion of our forefathers, caused that generous fertility which so much distinguished our lands in those days. But that fertility has departed since the wild pea has been exterminated, and it may well be questioned whether there be not a peculiar adaptation of the pea as a fertilizer to the soil of this region, and whether the use of it might not be one of the best means of renovation. The Indian pea has been declared by chemists to contain much of the peculiar nutriment constituting the substance of wheat, and it is known to afford a larger mass of vegetable matter than almost any other plant will produce in one summer. It grows better in dry weather than any other vegetable we have. It has been an almost universal custom for every family to cultivate a patch of peas for domestic use. A Middle or lower Virginian, having wandered to colder climes, could hardly think of his native home without remembering the cornfield pea. These pea patches have always been remarkable as yielding better wheat than the adjoining land. The knowledge of this fact has doubtless led to their more extensive field culture; and all who have tried the pea fallow, I believe, rank peas before any other green crop. There are many ways of cultivating them. Some drill them in: some sow them broadcast, immediately after ploughing in clover or grass, and cover them by running the big rake or drag in the same or exactly contrary direction to that in which the plough went. Some sow them broadcast with oats, and I have heard that the plan answers well. Others sow them in cornfields, and get them in with the last working of the corn. I have been told that on low grounds, cultivated in this way, the product has annually increased, yielding but 3 barrels the first year, and 8 barrels on the eighth. Peas are cultivated further south for the sake of the haulm as provender for stock. I know of no vegetable which in this climate would produce, on rich soil, a greater supply of fine food for animals. They have but recently been introduced in this section, and we cultivate them entirely as a fallow crop for wheat, and some gather the seed for sale.

The chief objections to pea culture on a large scale, arise from the time of sowing being a very busy one, and the great difficulty of breaking up land at that season, if drought occur. This latter objection may be obviated by a previous fallow in winter.

Hogs, Curing Bacon, &c.—The excellence of Virginia bacon is known far and near. We prefer dry and very cool, but not bitterly cold weather,

for killing hogs. After killing and nicely cleaning our hogs, we hang them in an airy place by their gambrels, from 12 to 24 hours, that the animal heat may escape, the blood may drip, and the superficial moisture may evaporate. They are then taken down and cut up, each piece being taken from the butcher, by other hands, to a table, where it is thoroughly rubbed, inside and out, with good Liverpool salt, having, according to size, from one to three tea-spoonfuls of pulverized saltpetre sprinkled over it, and squeezed around the bones that project. The saltpetre is chiefly put on the hams, sometimes on the shoulders, never on the middlings, which are nearly all fat. I have often eaten excellent bacon on which no saltpetre had been used. The pieces are then packed in "powdering-tubs," made of half-hogsheads, or piled upon broad planks. This is preferred when the weather is rather warm: if the weather afterwards be very cold, the meat is permitted to lie in this condition for six weeks. In soft, mild weather, it will "take salt" in three or four weeks. The salt should be piled between the layers thickly enough to prevent the pieces coming in contact, as this causes mouldiness. When it is known to have "taken salt," the pieces should be hung in the roof of the smoke-house, on poles, across beams fixed for the purpose, at such intervals as will prevent their touching each other. Moderate fires, made of green hickory or red-oak billets, or the green chips of suck-wood, are then to be carefully kept up, and especially attended to during damp or rainy weather, until the meat appears to be dry enough, and smoked enough, which must be judged of by the appearance and color. If very closely attended to, it will be converted into good bacon in three weeks. If some remissness be indulged, it may require six. As the fires are intended to dry and smoke the meat, not to heat it, they should, of course, be moderate; and if the house cannot be made perfectly dark, red pepper, bits of old leather, or slow-matches of brimstone should be burned in it, in warm weather, to keep off blowing-flies. After the bacon is cured, it should be packed in the "powdering tubs," with dry ashes or common salt. I prefer the salt, because it looks neater, more effectually excludes rats, is commonly cheaper in spring than fall, and will answer just as well as new salt for the next year's supply.

There are other ways of curing bacon, which do well. It is enough if it be well salted, smoked, and dried. I believe, however, that we are as much indebted to the dryness of our atmosphere for the excellence of our bacon, as to our skill in curing.

Tobacco.—The culture of tobacco is so well understood in Virginia that I cannot hope to benefit the planters of it by descanting lengthily on the subject; and those living elsewhere would take no interest in such remarks. The amount made per acre ranges from 400 to 1300 pounds. I judge the average product, in this immediate vicinity, may amount to 600 or 700 pounds. In districts where shipping tobacco is not aimed at, but light sun cured tobacco is made for manufacturing, and less manure is used, the average may fall as low as 300 or 400 pounds per acre. It is harder to estimate the average cost of production per cwt. If we compute only the simple cost to the individual grower in labor and expense, it might be put down at from $4 to $5 per hundred; and even less than $4, were he to make arrangements to become exclusively a tobacco-planter. This crop may be managed so as to be made without the expense of teams, the grubbing-hoe being substituted for the plough. But the expense of production is incalculable, when we consider its influence on the wealth of the com-

munity, by detracting all the manure from other crops, and a large share of the labor, while the attention of the proprietor must be withdrawn from those objects calculated to adorn and enrich his estate.

I cannot describe very definitely any new mode of curing tobacco. I have heard of a gentleman, in Nelson county, who has cured tobacco by packing the green plants in common salt, and permitting them to remain in that condition until such fermentation has occurred as prepares the leaves readily to cure on exposure to the atmosphere. The article thus managed is said to be fine. I know too little about it to detail the process.

What guano will do for tobacco planters, is yet to be tested. It certainly works wonders in some instances. There is now in my immediate neighborhood a field of good tobacco, just coming to maturity, on which no manure except guano was used. The land was so poor as to be utterly incapable of producing tobacco without aid. I believe it is generally thought that to cultivate tobacco alternately with wheat and clover is the best rotation to maintain the fertility of tobacco land.

Fruit Culture.—From my boyhood, I have been an enthusiast in fruit culture. I am glad to be able to say, that this branch of rural industry is receiving increased attention. I have been told that, 70 or 80 years ago, the orchards rarely failed. In modern times, there is seldom a general fruit crop, and often an almost entire failure. We often, in January and February, have weather warm enough for May, and sometimes we have hard weather in March and April. Low, sheltered places were formerly selected for orchards. In such situations, the ground becomes so warm as to swell the bloom-buds too early in the spring. Experience has taught that fruit-trees are most likely to succeed on our high, bleak ridges. This may be owing to the more profound torpidity, or *hibernation*, so to speak, into which the trees and roots have been thrown by the previous cold weather. I would recommend that the planting of permanent orchards be deferred until one can learn by experiment what part of his farm is best adapted to fruit-trees. This can easily be ascertained by setting out early-bearing trees in different localities. There are few years in which fruit would not escape, to some extent, in the best situations. It is, moreover, worthy of inquiry, whether trees procured from the North are not more easily stimulated to early vegetation by sudden changes from cold to warm, than our native trees. Northern trees, however fine their fruit in their appropriate climate, seldom yield good fruit here. I have 12 or 13 acres in fruit-trees, and, while I do not believe I have lost one native tree by the weather, several of Northern origin die annually. Most of them die from the freezing of the sap, bursting the bark from the wood, which happens in hard weather, after one of the warm spells in winter. It has been but a few years since I first saw an apple-tree affected with blight. I have lost no native trees with that disease, but some of those imported are liable to it, and those budded or grafted from them as much so as the parent. My trees are permitted to branch out near the ground, that their bodies may be shaded and the wind operate against the shortest lever. One main stem only is preserved to the top, from which side branches shoot. Large bifurcations cause splitting.

I have long attended to grapes, and have learned the following rules:—The cuttings should be well planted in November: the vines should be transplanted the second year, as large ones become wormy and die. They should be trained on high scaffolds with flat tops, that the grapes may hang beneath

and get air. Too little trimming is better than too much. Trim closely to the eaves of the scaffold, and a little on its top. Dig in manure from the hen-house, well plastered, and sprinkle freely slaked lime on the surface. Vines are more affected than any other fruit-bearers by peculiarities of soil, in their healthfulness and the flavor of their fruit. But few foreign vines do well here. Out of about 60 varieties, sent me by a friend and relative in Bordeaux, none bore well but a few of the *Chasselas* family. The *Pyrenean Chasselas* yielded a most delicious fruit, but they all died in a few years, in spite of my utmost care. I have rarely succeeded in budding or grafting vines, except between the 20th May and 10th June, and I cut off the part above the bud, as soon as I find it has adhered, that it may grow off at once. On the whole, I am fully convinced that the vine may be successfully cultivated here.

Manures.—This is an important subject to the farmer. I regard as the best plan for making and preserving manures from waste, to have a close reservoir for the urine, well filled with charcoal, sawdust, or any other light absorbent, plentifully intermingled with salt and plaster, where the excrement is kept until wanted for use, as dry as the guano in the South-sea Islands. A little ingenuity will suggest contrivances the most convenient to each individual, for effecting these purposes. My sheep and cattle are furnished with houses made by covering extensive frames of timber with straw, piled up in the shape of a "rick." Spacious as these are, I hope, during the winter, to make them so full of pine-leaves, and other absorbing litters, that there will hardly be room for the stock. It is needless to write long dissertations on making manures. We all know well enough how to make, and apply them, too, were we not so anxious to make money on poor land without them. Lime has been used as a manure in some few instances which have come to my knowledge—in some cases with no perceptible effect, which can only be accounted for after an analysis of the soil. It has sometimes yielded no benefit the first year, but much afterwards. Guano is looked to by many as the sovereign panacea for all the ills that earth is heir to. I have known signal successes and signal failures from its use. Much is yet to be learned about it. From 100 to 250 pounds are applied per acre; and I have seen striking effects from only 50. The use of plaster and its benefits are both increasing.

With sincere wishes for your personal and official welfare I am, sir,

Your obedient servant,

W. S MORTON.

CHINESE FRUITS, &c.

Washington, August 23d, 1850.

Sir:—It gives me great pleasure to lay before you the enclosed communication from Mr. S. Wells Williams, of China. This paper was handed to me by Mr. W., on the eve of my departure from Canton, with a request that I would bring it to your notice. It contains many valuable suggestions upon the subject of introducing into this country certain vegetable productions indigenous only to China. The well-known reputation of Mr. Williams, in both literature and botany, will, I am sure, bespeak for his letter your careful consideration.

Very respectfully, your ob't servant,

JOHN W. DAVIS.

To the Hon. Commissioner of Patents.

Canton, (China,) May 21st, 1850.

Hon. J. W. DAVIS:

My Dear Sir:—Having noticed, in late papers, that the project is mentioned of establishing, at the city of Washington, a department for Agriculture, I have thought that you would be willing to bring to the notice of this bureau, (supposing that the recommendation of the President will be acted upon,) the desirableness of introducing into the United States some of the valuable and important productions of China, and encouraging their growth in such parts of the country as are fitted for their culture. Among the plants which are worthy of the attention of this bureau, are the *lichi*, *whampe*, and *loquat*, among fruit-trees, and the *cassia*, *camphor*, *varnish*, and *tallow* trees, among useful trees.

All of these trees occur in the southern provinces of this empire, and would thrive equally well in the Southern States: all of them are indigenous to this country, and, except the *lichi*, none of them have, to my knowledge, been naturalized in any other country. The *lichi* is now grown in Bengal.

The *lichi* (*Dimocarpus lichi*) belongs to the family of the Sapindaceæ, of which only a few plants are natives of America, and they of no great value. The Chinese have 15 or 20 varieties, but there are only 2 or 3 which are distinctly marked, the others being the growth of different districts, and bearing the name of the places which produce them. It has been cultivated for ages in this country, and furnishes a large amount of food to the people, the produce of a single healthy tree often amounting to 4 bushels.

The *whampe*, (*Cookia punctata*,) or "yellow skin," as the name means, grows in clusters, like the lichi, but belongs to the same family as the orange, though, in shape and size, the fruit resembles the cherry. The wood is hard and close-grained, and would serve for various purposes in the arts. The fruit is pleasantly acid, and might be improved in flavor and size by grafting, for it is now, as seen in these markets, often sour, and harsh in taste, and not fully developed. The produce of the tree is not far from the average of 2 bushels, and, under some of the clusters, bearing 50 or more berries.

The *loquat* (*Eriobotnya Japonica*) resembles the medlar of England more than any other fruit, and has been introduced into hot-houses there. It belongs to the family Rassacea, and the subdivision of Pomacea, or apples,

pears, &c. The loquat ripens early in April, in this country, and is more hardy than the lichi or whampe: it is a more acid fruit than the apple, and serves for cooking rather than as a table fruit. Its size and flavor could both be increased, I have no doubt, by cultivation, and the fruit rendered a valuable addition to our list of early spring fruits, which are not numerous. The loquat grows as far north as Fuhchan, but does not produce as good fruit as in Canton.

You are well acquainted with the taste and qualities of these fruits, and are able to judge, too, whether they would repay the labor and expense of naturalizing in our own country. I think they would all become favorite fruits, before many years, and, from a comparison of climate, soil, and position of the two countries, I should infer that the shores of the Gulf of Mexico would be as favorable to their development as those of the China Sea. None of them are properly tropical fruits, for even a fall of snow here, in 1835, (Feb. 7th,) did not injure the loquat trees then in flower, nor cut off the crop of the lichis.

The other trees mentioned are valuable for their timber or products. The camphor and cassia both belong to the Laurinæ, or laurel family—the same as the cinnamon, sassafras, alligator-pear, and red bay. The camphor-tree (*Laurus camphora*) grows in Formosa, and the adjacent provinces of Fuhhien and Kwang-tung, where it forms forests, furnishing wood for timber, and camphor-gum for exportation; the latter is obtained from the leaves, twigs, and rootlets, by distillation, and the former from the trunk. Some of the boards brought to Canton are 18 and 22 inches in diameter, indicating a tree of large size. The tree does not grow near Canton city, but occurs most abundantly on the hills in the departments farther from the coast, and living plants could be most easily obtained at Fuhchan and Amoy, where large quantities of the timber are sold.

The cassia (*Laurus cassia*) grows west of Canton, in the provinces of Kwángsí and Kweichan, whence all the cassia fistula exported from this port is obtained. The cassia is not used for timber, nor does it grow to the consideration of a tree, the object being to increase the twigs, and produce as much bark and oil as possible. The manner of obtaining the cassia would be to send a native to Kweilin, in Kwángsí, and let him bring numbers of the plant, in all stages.

The varnish-tree is less known than either of the preceding, but is quite as valuable. It is allied to the sumach and poison-oak of America, and grows about 25 feet high, and the cultivators trim the branches to increase the size of the trunk. The varnish-tree is found across the mountains in Kwángsí, up and down the valley of the river Kan, whence the inspissated juice is brought to Canton in small cakes, for the use of the lackered-ware manufacturers. It has a much wider range, however, than this valley, and is cultivated over most parts of Central China, and in Japan, furnishing the material from which the well-known lackered-ware is manufactured, by mixing it with lampblack, cinnabar, and other substances, to give it a color. There can hardly be a doubt that the varnish-tree would grow in the United States, as far north as Philadelphia; and our manufacturers would soon be able to produce lackered-ware rivaling that of the Chinese: the processes of this art can all be learned in Canton.

The tallow-tree (*Stillingia sebifera*) is cultivated to a great extent at Ningho, Chusan, and the eastern provinces, for the white tallow which surrounds the seed, which is used for and possesses most of the properties of beef-

tallow, furnishing candles, cerate, plasters, &c., for housekeepers and doctors: it is not used for cooking so much as some other vegetable oils by the Chinese. Besides being serviceable for economical uses, the tallow-tree is one of the most beautiful shade-trees known in China, and, with a little care, can be made to take a symmetrical shape. The leaves resemble the aspen in shape and color; and even if the tallow should not be thought valuable for its own uses, the tree would form a valuable addition to the ornamental trees of our country. The tallow is produced in considerable quantities, for it is sold at a few cents per pound at Chusan; and, when mixed with wax, forms a good material for candles. Both the living plants and the seeds can be obtained at Ningho, and all the details of manufacture learned there. It is found about Canton, but is neither cultivated for its tallow nor its shade, as the heat here causes it to run to leaf.

There are many other vegetable productions to be obtained in this country, some of them of considerable use, in the arts. Among these may be mentioned, the *swan-chi*, or Chinese ebony, a tree whose wood furnishes a solid and excellent material for furniture, and is much employed in the carved work so skilfully done by the Chinese. It grows in the western provinces, and would require some trouble to procure available plants for exporting to another country. The *sheé-liáng*, a plant extensively grown in this part of China, for dying cottons and silk brown, is worthy of notice, as presenting a new sort of vegetable pigment; it not only dyes the cloth, but almost tans it, as it is very astringent. Many other pigments are known among the Chinese. The native indigo, cultivated in Cheh-kiang, being one of the most common, and probably inferior to the true indigo.

In respect to the best means of obtaining these plants, and forwarding them to America, I can hardly give any definite information. The three fruit-trees can be sent from this port and Amoy, but all the others must be sought elsewhere. The varnish and cassia trees can only be obtained by trusting their procurement to natives, whose time and travelling expenses must be risked in sending them to the districts where the plants grow, and something trusted to their knowledge of what is wanted. Margin, too, must be left for the expense of unsuccessful attempts, and the death of plants on the passage. The three fruit-trees have all been grown in English hot-houses, and, perhaps, specimens can be obtained there also. I should think the object worthy of an attempt; and, if a few hundred dollars would obtain it, the introduction of so many valuable plants would amply repay it. An appropriation of a thousand dollars, to be expended under the direction of the consuls, might be made, and the experiment attempted, if it comes within the duties of this Bureau of Agriculture to apply their funds to such objects. It would perhaps hardly repay the expense to send out a person for such an object, but the man who undertakes to collect them should be encouraged by the assurance of remuneration, if his attempts be successful. The cassia and camphor trees furnish valuable articles of commerce. The exportation of the gum, the bark, wood, and oil, obtained from them, amounting to fully $200,000 annually. The consumption of camphor-wood in China is enormous; and if it grew among the forests or preserves of our own country, would, I am sure, be equally prized: its bulk quite prevents its being carried to America as timber. The manufacture of cassia-oil would, I think, repay the expense of introducing the cassia-tree, and enlarge the consumption of an article of which the supply here is seldom equal to the demand, and

whose manufacture is attended with considerable trouble and expense from the immense amount of fuel required to distil it.

Attempts to enlarge the sources of national wealth, by the introduction of the productions of other countries, belong to a government, and unsuccessful attempts fall easily on a government, though disastrous to an individual. The attempts now making to introduce the cultivation and manufacture of tea into Carolina will certainly disappoint, for the tastes of our people are formed from the Chinese manufacture, and this has never been successfully imitated abroad; and besides, none could compete with the Chinese in the labor of preparing tea for market.

Such would not be the case with the trees I have recommended, for it is their natural fruit and produce which are wanted.

Commending the subject to your consideration, and hoping you will bring it to the favorable notice of the department at Washington, which is referred to above as about to be established,

I am, my dear sir, most respectfully yours,

S. WELLS WILLIAMS.

Oakland Farm, near Springfield, Clarke County, Ohio, November, 1849.

Dear Sir:—It is with much diffidence that I attempt to answer the queries contained in your circular; but so far as my experience goes, you shall have it freely.

Wheat is first in importance, and first on your circular. We have here 10 or 12 varieties, of which only 3 or 4 are under names known out of the neighborhood. That in most general favor, from its productiveness and early maturity, is the "Mediterranean." This has a large berry, with a thick dark bran, and weighs from 60 to 66 pounds to the bushel. It has improved in quality of late years, and, with care in grinding, makes a very fine quality of flour. The old *red-chaff bearded* is fast getting out of favor, from its failure within five years. Though never considered very productive, yet it withstood the fly, frost, and rust better than other varieties. The *Wabash* is a bald wheat, with a very thin white bran, stands up well in low and rich ground, but is not much raised, from its lateness in ripening, and not more than one crop in three is first-rate: weight from 56 to 60 pounds per bushel. A variety has lately been introduced from a neighboring county, under the name of *Shot wheat*, which, I suppose, is a local name, but denoting well its peculiar plump character. It ripens about the time of the Mediterranean; has a bearded and stiff straw, a fine, round, red berry, and will yield nearly equal to the above: the usual weight is 60 to 62 pounds. Other varieties are raised in different sections, where they are favorites. The only serious enemy the wheat crop has to contend with is the Hessian-fly; and that has not troubled us much for the past two years. The weevil has been very troublesome in some parts of the State; but I have not yet seen any signs of it here. The *rust* is its most serious disease, and is, indeed, a severe check to the cultivation of this grain. This year, from the estimates made, there will not be one-third the usual average crop in this State. In regard to change in character, I find a marked difference in quality when raised on different soils; and experienced millers say they can make from 1 to 2 pounds more flour per bushel, from wheat

raised in uplands than from the same variety grown on black bottom soil. We consider the medium between the high and low lands, or what is termed here, "second bottom," the best soil for this crop. Not one acre in ten of wheat has any manure applied. A summer fallow, or corn ground after that crop is taken off, is the usual custom. But sometimes two or even three crops in succession are taken off the same land. The common mode is to put the manure on the fallow ground, and plough it in when the grain is sown. The straw is very little valued, and often burned in the field, and is seldom taken into account as food for stock. The average crop of this and the adjoining counties cannot exceed 14 bushels per acre; and this, I think, is about the average of the State.

Oats.—These are considered a secondary crop in this section. The varieties cultivated are the *common dwarf*, the *side oats*, and the *Tartarean*. The first is not so productive as the other two, but stands up best through our summer storms. The second is most productive, but grows tall, and is very liable to fall. The third is a new variety, introduced within a few years, and is liked so far as known, from its stiff straw and large-sized berry. The straw, from its softness, is used as food for stock. This grain is generally considered of about three-fourths the value of corn for feeding to stock, but is preferred to corn for horses. Standard weight, 33 pounds.

Rye.—There are two varieties in use, known as the *white* and *black* rye. It is principally sown on low, rich soil, which will not produce good wheat, and is quite a certain crop, yielding 20 to 25 bushels per acre. But, from the low price it bears, compared with wheat, it is not much raised. It is nearly all consumed in distilling; and but a small portion is ground for bread. Near towns, the straw is expected to pay the expense of threshing by hand.

Corn.—We have many varieties of this grain, mostly crosses between the gourd-seed and small flint. Our seasons are not long enough for the first, but a larger and later variety than the latter is preferred for this climate. We find by experiment, that this grain soon becomes acclimated; but, in so doing, it loses its peculiar characteristics, and becomes larger or smaller, as the case may be. With good cultivation, our medium lands will produce from 50 to 75 bushels; but the average of this county will not exceed 40 bushels. It is generally ripe enough to cut up on the 15th or 20th September. Our uplands produce the heaviest grain, but the bottoms yield larger stalks and ears. I have never tried any experiments to test the comparative value of the husk and blades; but have observed that sheep, if they have plenty of both, will often refuse the husk entirely; while cattle will eat the husk first, and then the blades. We find that ground corn well repays the extra expense; and the profit of cooking is illustrated every day at our distilleries, where, after the process of distilling, the refuse is found to be equal to the grain in a raw state.

Hay.—We generally consider clover best for cattle, and timothy for horses; but most of our hay is composed of these mixed. Clover is chiefly raised for pasture, or as a fertilizer, and timothy is only raised alone when intended for market. Herdsgrass and timothy is the common mixture for our natural meadows, where the first forms a solid turf, and eradicates the natural grasses. The average produce of pure timothy per acre, I should say, does not exceed 25 to 30 cwt.

Root crops.—Irish potatoes have always succeeded well here until within 2 or 3 years, since which time they have suffered much from the rot. The

average yield in field culture does not much exceed 100 bushels per acre. The sweet potato requires a warmer soil and climate than we have here to succeed well. Turnips are rendered very uncertain by the fly, and warm, dry weather at the time of sowing. Beets, carrots, mangel-wurzel, and artichokes are raised to but a limited extent, as food for stock; and, from experience, I think their culture is not profitable, when labor is so high and other fodder so plenty.

Horses and Mules.—Of the number in the State, I have no data upon which to base an estimate. The average value of working-horses here is about $50, and of mules over 3 years old, $60 to $65. Very few of the latter are used, though they are undoubtedly cheaper than horses.

Cattle.—At 3 years old, if of common stock, their price ranges from $15 to $20 per head; if of improved blood, from $30 to $40. Our cattle are driven to the eastern part of Pennsylvania and New York. Six dollars per annum is the usual estimate of the cost of feeding stock from 1 to 3 years old. The Durhams seem to be the favorites, of which we have some very fine specimens, chiefly descended from the Sciota importations.

Sheep.—Wool-growing is quite an extensive branch of industry in this part of the State. Ninety thousand pounds of wool have been bought in our county town the present season; and the aggregate clip of the county is from 75,000 to 80,000 pounds. Nearly all our flocks show the crosses of the Merino and Saxony with the common sheep of the country. From 3 to 3½ pounds is the average clip. The cost of keeping through the year is about 50 cents per head.

As my experience in farming has not been of many years' standing, it must be my apology for any errors that may exist in the above report. Such as it is, however, it is most respectfully submitted.

Yours truly,

J. MORRISON WARDER.

Hon. THOMAS EWBANK,
Commissioner of Patents.

TRANSPLANTING FOREST-TREES.

Report of the Committee of the Rockingham Farmers' Club, "On Transplanting Forest Trees."—Submitted April 4th, 1849.

The kind of Trees.—Above all others, for the street, the elm is preferred. For beauty, gracefulness, *grandeur* even, it has no equal in New England. Besides, it is hardy, long-lived, easily procured, and free from the attacks of insects and disease.

The rock maple comes next—a beautiful and stately tree, though somewhat precise and rigid in its outline, and of much slower growth than the elm. It is hardy, bears transplanting well, affords an impenetrable shade, and, alternating in rows with the elm, by the wayside, or mingling in groups, where there is room for them, it affords a beautiful and desirable variety. Neither the red maple nor the white maple can be compared with the rock maple. They are smaller, shorter lived, less hardy, and altogether inferior to it in grace and beauty, and are recommended only where there is room for variety.

The white ash is a tree which seems not to be appreciated, and is one of our finest trees; and, for size, durability, and beauty, entitled to the third place in our list.

Then we have the bass, or American linden, not surpassed by any tree in the richness and beauty of its foliage. A tree not sufficiently hardy, perhaps, for the street, but "beautiful exceedingly" in a lawn or private grounds.

The beech is a tree deserving its classic fame, but too full of local attachments and home feelings to survive removal without great care—and the walnut is liable to the same objections.

Where space allows, as in public squares and lawns, avoid rows and circles, and mathematics in general, in tree-planting. Avoid sameness in kind, and size, and shape, and endeavor to imitate the cunning hand of Nature in tasteful irregularity of grouping.

Time of transplanting.—All deciduous forest-trees may be removed at any time after the fall of the leaf in autumn, and before the bursting of the buds in spring. If removed in the bright, warm days of spring, their roots should be carefully shaded from the sun, and, in fall and winter, they must not be exposed naked to severe cold.

Preparation for setting.—For trees upon the streets, dig the holes 6 feet in diameter and 18 inches deep, *before the trees are procured;* replace the subsoil with good soil, and procure enough more and deposit near, to fill up level with the earth, so as not to use the sand or gravel from the bottom; and have ready two pieces of joist or plank 4 inches wide, with proper strips of board for protection of the trees. Do all this at your leisure, before the trees are dug. It is the largest half of the whole operation, and should never be left to the hour when, returning late, weary, and heavy laden from your labor of procuring them, you will have neither time nor strength to perform it carefully and speedily, and when your poor trees, like so many fish out of water, are panting and suffering for a return to their native element.

Selection of Trees and digging up.—Procure trees from open land rather than from thick woods, if possible, and those of thick and low growth rather than tall and slender trees, and be sure they are young and growing. It is generally advised to take them from land similar to that where they are to be set; but this is not essential. Elms from swamps and bogs, transplanted on dry lands and pine plains, are now growing all about us in Exeter. It is of more importance to take them from such soil as will allow their removal with least injury to the roots, and, therefore not from land filled with stones or large roots.

Some writers insist that the trees be marked before removal, that they may be set in the same position as to the points of compass as before; and the *theory* is reasonable, though the practice, however it may promote their growth and comfort, is not essential to their life. They soon "get the hang" of their new position, if the theory is disregarded; while Sam Weller's reason for a father's whipping his boy, "It can't do any hurt, if it don't do any good," may be given in support of the practice.

Having selected a tree of about three inches in diameter, with a sharp spade, an axe, and a bog-hoe, dig a trench about two and a half feet from it, completely round it, deep enough to cut off every root; then dig under it till it is loosened, using no crowbar or lever to gall and split the roots, and carefully preserving all the small roots and fibres. Load the trees,

when dug, upon a long wagon, putting pine boughs under them to prevent rubbing, and cover the roots from the sun. About a dozen such will make a load for one horse, and three or four smart men can dig and get them home in half a day.

Trimming and setting out.—With a fine saw and a knife, cut off smoothly all the broken roots. *Next, cut away one-half, at least, of the top*, either by shortening the limbs, or cutting part of them away entirely, as the shape of the tree may require. We are aware that this is disputed territory, and take the responsibility of holding it. We suppose that the sap is supplied through the roots, that in hot, dry weather evaporation goes on rapidly from the leaves, and, if that evaporation exceeds the supply of sap, the leaves wither and the tree dies. But there are other reasons for lessening the top. The tree has grown in a sheltered position, protected from the rude "winds of heaven"—perchance in society, resting its long arms on the shoulders of its friends and kindred—supported in the loving embrace of its companions. It has had no discipline or preparation for the cold, and lonely, and trying exposure of a public position. But now you have cut away its old supporters—literally *root and branch.* With its full top exposed to the tempest, the small, newly-formed roots, which should attach it to its new position, are constantly broken off, and it cannot live. This is the cause of the failure of many attempts at transplanting. Plant the tree no deeper than it grew before. Nature, which has attended to growing trees some six thousand years, understands well how they should be set, and cannot be improved upon. Drive your stakes before the roots are covered, that you may not injure them. Then, having carefully placed the roots in their natural position, fill up with finely pulverized soil, and see that no space is left beneath them. When the roots are fully covered, place about half a bundle of straw, or as much hay over the whole surface of the hole, and cover it with soil, leaving in spring a little hollow about the tree. If you plant in the fall, make a little heap of earth about the tree to turn off the water, and remove it the next spring. The straw will prevent the evaporation of the moisture about the roots and keep the soil around the tree light for several years: it tends to prevent the growth of weeds and grass, and admits the free passage of rain, or water artificially applied. Do not omit this precaution; it is almost essential on sandy land.

Care after planting.—If you plant trees in a public street, do not consider the work complete until they are protected from animals, as well as from motion by the winds, by securing them with stakes, as before suggested. A strip of board on each of the two sides of a tree, or a strip of leather put round it and attached by a wire to each stake, will protect it sufficiently against the racking of the winds, and against roving cattle, which take delight to find a new tree to rub against. But we may still utter the prayer, "Save us from our *friends*," for many of them seem to think that trees are principally useful as a means of *securing horses.* Trees then, near your dwellings, should be boxed up about seven feet high, if you do not intend to lose both your friend and your tree. He will tie his horse to your tree, and the horse, of course, will amuse himself with gnawing the bark. You will be exceeding vexed, and possibly rude, and will be *consoled* by the assurance that he never knew his horse to do so before; and you will part, your friend grieved at the accident, and you wishing him and his horse at the end of their journey.

If a drought comes in midsummer, such as those forgetful people, the

"oldest inhabitants," do not recollect to have seen—and such seasons are nothing unusual—if then, once a week, you give the trees a copious watering, it will be an act of generosity which they will not forget; but, if planted according to the foregoing directions, in ordinary situations, nineteen of every twenty of them will live with only the water from the clouds to moisten them. We believe it to be not only unnecessary, but a positive injury to trees to water them daily.

Transplanting Evergreens.—There are no trees more beautiful than the hemlock, the white pine, the spruce and the fir-trees of our own hill-sides, and yet comparatively few of them are seen about our dwellings. The reason is to be found, partly in the want of a just appreciation of what is so common, and partly in the idea that this class of trees cannot be successfully transplanted. This idea is entirely erroneous. In the month of April, 1847, 140 white pine trees from 5 to 8 feet high were transplanted in Exeter, only one of which has died in consequence of the removal.

In the moist climate of England, the summer is said to be the best season for transplanting evergreens; but a variety of experiments have satisfied us, beyond doubt, that this is not the case here. The method to be pursued is this:—Select trees on the open plain, and, with a spade, cut down around them, leaving a circle of turf, two feet or more in diameter, about each tree—and then lift the tree and set it upright in the wagon, with the ball of earth unbroken.

At the place of planting, a hole is to be made, corresponding with the ball of earth, the soil at the bottom made light, and the tree set in, and with a little earth thrown on and pressed down, and the work is done.

Care must be taken to load the roots with stones, or by driving a short stake by each tree, and confining it, that the wind does not upset it. Evergreens should not be much pruned.

Their foliage is covered with a gummy substance, so that evaporation does not go on so rapidly from them as from deciduous trees, and they do not rapidly recover their beauty of form, if mutilated.

Evergreens should be planted in groups, both for beauty and that they may be partially shaded and sheltered. Plant the evergreens of our own forest. In no way can bare walks be so readily screened or the stark and blank landscape so beautifully variegated and adorned, as by setting, here and there, little *vases* of the white pine and hemlock.

Transplanting in winter with balls of earth.—The best of all methods of moving trees of any kind is that suggested in the above title. The process may be described in a few words:—Late in autumn, dig a trench completely round the tree, at a distance proportioned to its size, cutting off all the roots, and digging under the tree, but not so as to loosen it: then dig away the earth on one side of the hole, so that a shed, or drag, may be backed down under it: place some straw or leaves in the bottom of the trench, or cover it with boards, that the bottom may not freeze too hard. Leave it until the ball of earth is frozen hard, and, when there is a little snow, remove it. It will, of course, be necessary either to dig the hole for receiving it, before the ground is frozen, or to cover the place intended for it with straw, that the hole may be made in winter. In the former case, a few loads of soil, with which to fill up, may kept in a barn-cellar, or otherwise protected from frost. Great care should be taken to fill compactly every crevice about the ball in setting, and it is well to confine the tree to an upright position, by braces from the ground against its lower limbs, or by other

means, that it may not lean when the frost comes out of the ground in spring. By this process, we have known elm-trees of 12 and 18 inches in diameter, and hemlocks 25 feet in height, removed with perfect success.

Indeed, if the work is done with skill and care, the tree, on *awaking* in spring, will scarcely know that it has changed its place, and will soon become entirely reconciled to its new position. In this mode, little pruning is necessary, and most of the top may be saved, as the greater part of the roots may be preserved.

The weight of an elm-tree a foot in diameter, with a ball of earth 6 feet across and 18 inches in thickness, would be, probably, 5 or 6 tons; and, in order to execute the work properly, a set of ropes and pulleys would be found convenient. Trees of 6 inches in diameter may be readily moved with a yoke of oxen and the implements commonly at hand.

In conclusion, we would say to all, *plant trees;* let every *young* man plant trees, that he may have something ever near to bring back pleasing recollections of his youth—something, when he is an old man, that will seem of his own age, and sympathize with him, and look on him with a familiar face, that he may not feel quite alone among a new generation. Let the *old* man plant trees. They will, perhaps, be beautiful in his own time, and entice him to remain longer where there is still something left to interest him, and where he may still be useful; and, at least, they will keep alive in the minds of men the memory of one who lived not for himself alone.

For the Committee,

H. F. FRENCH, *Chairman.*

Exeter, N. H., April 4th, 1849.

Talladega County, Talladega P. O., Ala., December, 1850.

Sir:—Having received your circular, I feel disposed to respond, although a small and inconsiderable farmer. The information sought after is of so great importance to the agricultural interests of our common country, that I feel regret that my means of imparting information on the subjects of inquiry presented in the circular are so exceedingly limited, being restricted to the narrow limits of Talladega county, in which few of the subjects of inquiry are cultivated, and even those with more labor than skill; for, as yet, the Talladegians have not turned their attention to scientific agriculture.

The county of Talladega, in this State, (Alabama,) possesses as many advantages as any part of the country I have seen. The valley is chocolate-colored soil, of limestone and stiff clay foundation, and, therefore, well adapted to the cultivation of wheat, oats, Indian corn, tobacco; and the red valley lands of Talladega county resemble, in every point, the red lands of Morocco, in Africa; the climate is precisely the same. John Gray Jackson, who resided at Mogadore, as consul-general, for 12 years, says "that a crop of wheat would feed the entire people for seven years. But the government of Morocco does not admit exportation, except as a special favor, and thousands of acres are left unreaped on the fields." Were it not for that great Southern staple, cotton, (the pest of the age,) Talladega county can compete with any grain-growing part of the United States. When the price of cotton is a little enhanced in value in market, all improvements are

dropped, and the whole people rush into the cultivation of that article. No attention is paid to manure.

Bordering on our valleys, we have pine land resembling the pine lands of Georgia and Carolina, affording valuable timber, and the best kind of land for grazing; and when we consult the histories of the pine-clad hills of Sweden and Norway, that have done more for those countries than the rich lands bordering on the Danube and the Vistula, we are compelled to consider them the most valuable land we have. These fine hills abound in iron ore; copper veins have been discovered; gold, marble, and lead are found on those hill lands of pine and oak. With all these advantages around us, we will direct your attention to our agriculture.

We have an agricultural society, called the Talladega Agricultural and Mechanical Association, that has existed some five years. The late Colonel Taul was president at the time of his death, last June. The duties of secretary devolve on myself. This society awakened the attention of the people for some time, and a spirit of improvement was aroused among farmers generally. Very flattering reports of the productiveness of our county were handed in and read.

We have a great variety of wheat; the most successful is called the Orleans wheat. It may be sown as late as December, and succeed well. The usual time of sowing is from the 20th October to 20th of November. This variety of wheat may be sown so late that it escapes the ravages of the fly, and it comes on and ripens so early, it generally escapes the rust, while other varieties are more or less injured by both. The best manner of preparing land for a wheat crop, if upon stalk land, is to break the land deep, subsoil it, level the surface, by drawing a harrow or large brush over it; then seed down the land, I would say, from 1 to 2 bushels per acre, according to the strength of the land, and plough it in deep with a very small plough. In March, upon pine-hill land, 20 bushels of lime per acre should be spread on the field; and, in the last of April or middle of May, about 50 bushels of charcoal per acre will secure the crop against rust, and increase the product of the wheat crop. Wheat cultivated in this way is always secured against the grub, wireworm, and fly, as well as the rust; and the thinnest land will average 25 bushels per acre, where its usual product is not more than an average of from 8 to 10. The quantity of wheat per acre will diminish if sown, and continued to be sown, upon old lands, in the usual way. The price of wheat in Talladega is $1.50 per bushel. As a rotation crop, wheat succeeds better after cotton than any other crop.

We have a great many varieties of corn, some highly spoken of; other varieties preferred by different people, according to fancy. The yellow-flint stands, in my estimation, the highest, though not approved of, for its color, by others. It grows off freely, ripens earlier, stands drought better in our Southern country than any variety I know, and yields more on the field, from the fact that it can be planted much closer than other varieties. I have made an experiment by blending the yellow flint with the red-blaze variety, and I have succeeded beyond my expectation—a sample of which I will forward to the office. The *rationale* of the experiment is this: the yellow flint was considered too small, although it possessed more oil and saccharine juices than the other varieties, that contain so much starch and gluten, with woody fibre, and are affected severely by drought, grow late, and exhaust the soil considerably more than the yellow flint. Now, blend the varieties, and you have the very corn desired; one that grows well upon thin land,

may be planted very thick in the row, bears drought, matures early, possesses more saccharine matter than the other varieties, and makes a larger corn than the yellow flint, possessing all its desirable qualities. The manner of cultivation is, simply to subsoil the field well in breaking; lay off the rows 4 feet wide, and subsoil the furrow for planting, by running a deep furrow in the bottom of the one intended for planting; give 2 feet between the stalks in the row, and cover lightly, not more than an inch deep. I prefer the drill planting to hill planting; it is the most convenient way, and easier cultivated, with a considerably greater production from the same field, as well as a less exhausting manner of cultivation. When the corn is up, just take a side-harrow, or cultivator, and run by the side of the plants, filling nearly up the furrow made in planting. Two harrowings and one ploughing are sufficient to insure 80 bushels of this variety of corn to an acre, on even tolerable land, with a favorable season. No hilling or hoeing is necessary, if the harrowing and ploughing have been done properly.

The best method of feeding corn to stock is by grinding and cooking. Hogs particularly will fatten on half the corn ground and cooked, that they would require fed to them whole; that experiment has and will succeed in every country, and has been long established by even common sense. The manure formed by feeding 20 bushels of corn to hogs, carefully saved and skilfully applied, will make 40 bushels of corn to the acre, where 25 would grow before.

My experience about rye, peas, and beans is that they are fertilizers or renovating crops; they, however, are not attended to in Talladega. No crop equals the pea crop as a renovator; it takes its own nourishment from the atmosphere principally, while its vine protects the land from the exhaustion of exposure to the sun.

Cotton, our great staple, has experienced a great falling off this year, owing to the unfavorable season. The average yield of cotton is 1000 lbs. of seed-cotton to an acre; though the valley will yield considerably more to the acre. The chocolate lands produce cotton finely. The cost per pound is something like 3 cents.. All crops do well in rotation after cotton; various experiments have been tried to prevent the rust, army and bollworm; but none have given general satisfaction, so as to command confidence. The most approved method of cultivating cotton is to plough deep, subsoil the whole field, and then ridge, plant shallow, and cultivate lightly. Cotton land can be improved without resting, by manuring deep, subsoiling, and imbedding the stalks, limbs, &c. in a deep furrow, or subsoil in the middle of the old rows, make the new ridges on the subsoiled furrow, containing the old stalks and limbs, with a little scrapings from the barn-yard and lots, or even scraped up in the woods, where leaves and litter are rotting, will not only keep a cotton field up, but will enrich it every year, though constantly cultivated. Cotton-seed is a great fertilizer, equal to any thing known, when properly applied to either wheat, oats, or corn: it makes splendid food for sheep, cows, and hogs, if boiled with meal.

Rice I have tried upon stiff red-clay upland, and I found the production to surpass my expectation. My experiment was on a small scale, but sufficient to show me what could be done by the cultivation of rice upon upland. I planted a piece of ground in rice, 60 feet by 20, that produced 12 bushels of rice without any extra cultivation, beyond drawing a furrow, and dropping the seed, and keeping down the weeds. Rice is one of the most productive grains in all the Southern country, and will be cultivated

to considerable extent, if a market can be found for it, or if cotton should cease to be a staple. Clover and herdsgrass are beginning to receive attention in this county, and promise to do well; nearly as much so as what is grown in more northern latitudes. Thus, you see, that seeds and plants meet in Talladega county, as extremes of latitude from north to south, and flourish side by side. I have seen an account of a clover-seed in the Patent Office, from Brazil, I think, that was furnished by our consul, residing at Valparaiso, termed southern clover, which succeeds well in Florida with Governor Brown. If any remains in the office, please forward the seed to me for the benefit of our Agricultural and Mechanical Association.

Yours, respectfully,

J. A. BROWN.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Williamsport, Warren County, Indiana.

Sir:—A reply to the Agricultural Circular received by the subscriber, may very properly be commenced with some mention of the season, of the products of which it asks information. The winter, which, for six weeks in January and February, had been unusually mild, resumed its accustomed severity in the latter half of the latter month, and continued without abatement till the middle of April. Pasture to sustain cattle did not occur till the 1st of May. The planting of corn was unusually delayed, owing to the backwardness of the season. Much corn never came up, and the stand generally, in this section, was very poor. Then succeeded a period of drought, stunting the meadows, and dwarfing the corn, varied by but a single shower, sufficient to wet the ground to the depth of 4 inches, until about the 4th of July; from that period till the latter part of the fall, the rains were more seasonable, but never such as to swell the streams, or replenish the wells. Our river (the Wabash) was never lower within the memory of the residents of this section. While the heat of summer was uniform, and continued, it was never extreme.

Wheat thrived and yielded well; oats were a short crop.

The settlement of this county cannot be said to have commenced till 1827. Its agriculture, so far, may be characterized as diffuse, improvident, and exhausting. It is only within a very few years that the necessity of a more economical mode of farming has at all been felt. Within the last three years, clover has been used to manure, and as a preparation for wheat, by a few persons. Tradition says that, in the early settlement of the country, no difficulty was felt in raising wheat, either in timber barrens (oak openings) or prairie, the crop being certain, and the yield large: now, raising wheat on the prairie is more uncertain than the yield of a lottery ticket, or the result of an election bet.

The varieties of wheat most in use in this county are the Columbian or Mediterranean, the golden chaff, the China, which is a yellow chaff and heavily bearded, and the bearded red-chaff. The popular names by which they are known in the neighborhood are given, the subscriber and his informants being alike ignorant of their botanical appellatives. The first is the favorite variety, being earlier to the harvest by a week; both it and the golden chaff have less blade and fur, and are believed to be less liable to

rust for that reason. Wheat is sowed, in this region, from the last of August till the middle of October, with no preparation beyond a ploughing from 2½ to 3 inches deep. Much wheat is put in on corn ground with a shovel-plough, the corn being afterwards cut up and shocked. Harvest-time seldom extends beyond a week, and varies from the last week in June to the first week in July, according to the season. Wheat yields as low as 10 and high as 25 bushels, and may be said to average at 12 bushels per acre. It is sown in amount from a bushel to a bushel and a peck to the acre, though an additional bushel of seed not unfrequently adds 5 or 6 bushels to the yield. The product per acre falls much short of the earlier returns, but has advanced on that of more recent culture. It succeeds best on fallow or sod. No remedy for the fly is known or attempted. Weevil is not here. Those among us who know it in Ohio, believe that wheat is best secured against its depredations by threshing, and putting up in the chaff. The average price hereabout may be stated at 65 cents.

The undersigned once believed the gourd-seed corn to be the preferred variety; but further inquiry has shaken that opinion, without establishing any other as a preference. With some, the smooth white is most esteemed. It has a stiffer stalk, and is less liable to break in high winds than other varieties—a quality not without value in a prairie country. The yellow corn, being some 3 cents above white in the market, being as easily raised, yielding better in the opinion of some, on account of its smaller cob, and being easier husked, because a smooth grain, than the white, will always enlist the preference of some; and, of that kind, a long variety, with no special designation, but having an ear from 10 to 13 inches in length, is much affected by some who have strong land. It has a large cob, which makes it measure well in the wagon or barrel, and would be much more cultivated for sale, were it not that, taking the entire season to make itself, it is liable to be nipped by early frosts. Forty bushels of corn are claimed here to be the average product per acre, and it is, perhaps, not far from the truth. A hand, at $12 per month, for 3 months, in cultivating, and 2 in gathering a crop; a team worth $120, which will pay its expenses during the balance of the year, and is therefore only chargeable with half the interest on cost and half the annual depreciation, amounting together to $10; implements, the wear and tear of which will not exceed $10 per annum; and the board of a hand for 22 weeks at $1.50 per week,—form the elements for estimating the cost of cultivating 20 acres, which will yield 800 bushels, worth, at market, 30 cents per bushel, chargeable, of course, with the expense of marketing, and to be credited with the value of the stalks, or fifty cents per acre.

A shallow plant, in close rows, say 3 feet apart, which lays the grain liable to the germinating influence of slighter showers, and shades the ground at an earlier period of the season; a harrowing as soon as the corn is up; a ploughing and cross-ploughing, first with one and next with two furrows in the row, making in all four ploughings with the shovel-plough,—is the course pursued by the best corn-raisers. There is no point in the culture of corn about which men are more generally agreed, in this section, than the propriety of constantly stirring the ground in dry seasons. It was abundantly demonstrated in the past summer. On the 4th of July, corn, on an average, was only knee high, owing to the drought described in the early part of this communication. But, though stunted, it was, owing to the constant stirring of the ground, free from weeds and of a good color. That week

there fell a plentiful shower, and the corn, which had grown below while unable to grow above ground, sprang up as if by magic, and, in a week's time, a man and team could not be seen while tending it.

Corn, hereabouts, is only fed whole. When fed to cattle, followed by hogs, this course is far less wasteful than it would seem, the hogs consuming the corn which passes undigested through the cattle. When this is done, it is customary to have two enclosures, in which the cattle are fed alternately —the hogs occupying that which the cattle had been fed in on the previous day. This, however, is said by some to be unnecessary, as the hogs, after the first few days, give preference to the swollen and partially digested grain that has passed through the system of the cattle.

There are four varieties of oats cultivated hereabouts:—the black, the white, the barley, and the side oats, each of which has its advocates. The average products are 35 bushels per acre. It is less exhausting to ground than corn, and, if followed by the latter, the crop of corn will be better than that which preceded it, other things being equal.

The average yield of hay is believed to be 1¼ ton to the acre: timothy, clover, and herds-grass are all used in laying down meadows: the cost of hay per ton is from 60 cents to $1.08 per acre, not reckoning the cost of land.

A good calf costs $4 at weaning, the expense of rearing which may be averaged at $3 per year, till 3 years old, when, at an average, a steer will be worth $16.

Wool-growing is not profitable in our section: the number of lambs saved is not over one-half.

As to hogs, a cross of the China and Russia hog is believed by some to be the best, having sufficient size, and a kindly tendency to fat. Twenty-five bushels of corn will make a hog weighing 220 pounds, with range of field and woods.

Owing to the circular being mislaid after the information was collected, this communication is delayed till this time. A more prompt attention will be given to it another time, if it is deemed desirable.

Very respectfully yours, &c.,

C. R. BOYER.

THOMAS EWBANK, Esq.
Commissioner of Patents.

Palmyra, Wayne County, N. Y.

Sir:—In compliance with your circular of August last, I will cheerfully contribute my mite. I am a mechanic, a tailor by trade, and continually occupied: therefore, but little need be expected; but, so far as I have farmed it, I have been a close observer of results. In the fall of 1836, I purchased 16 acres of meadow and pasture land, situated half a mile out of our village, north of and adjoining the Erie Canal, which leaches more or less and wets the land on the surface some considerable distance. The soil, black mould and clay bottom on the low land, and gravelly loam and clay bottom on the high land: the land was in a bad state, cold and wet, stony and full of scrub-bushes, elders, &c., and very uneven surface. I paid $35 an acre for it: there was not a rod of good fence on it. I commenced work in the spring of 1837, and have made more or less improvements every year since, until

it has become like a house-floor on the surface, and has averaged two and a half tons per acre of good timothy and clover hay yearly, for the last ten years. I divided the land in three lots the first season, and made all my outside fences with swamp-oak posts and hemlock boards, costing $1 a rod; the best and cheapest fence that a farmer can make in this section of the country: swamp-oak posts will last from 20 to 30 years, if sawed from live timber; the same with hemlock boards. I have paid out in improvements, during the time, say $65 an acre, all told, in *fencing, grubbing, taking out stone and making blind ditches with them, seeding, &c. &c.*, making a cost of $100 an acre, exclusive of all manuring. As I said above, it has averaged two and a half tons of hay an acre, of the best quality, at an average price of $5.50 a ton, delivered in this village, from the meadow, when cut, or $2 for fall feed, at 37½ cents a week for horned cattle, making an income of $15.75 an acre. I have, until the last two years, hired it cut and delivered for $3 an acre; but I find I can please myself and customers better to hire it done by the day, at a cost of $4 or more, superintending it myself. The usual price of labor is $1 a day of ten hours, for a man and board himself, and $2 for a man with horses and wagon, excepting in haying and harvest, when they work more hours and higher wages, 25 per cent. or more. The land now clears me about 12 per cent. on $100 an acre. *I have uniformly kept Dr. and Cr., and charged* $1 *a day for my own services, and interest on the investment*, striking a balance on the first of January in every year, and *adding one year's interest on the balance until it has ceased to be a debt.* On the first day of January, 1850, fourteen years after my purchase, there was a surplus of $40, giving me 7 per cent. interest on all costs and charges from beginning. *The land and* $40 *in cash as costing nothing.* This land has been brought to its present state by many blind ditches leading into a large open ditch running through the field. The blind ditches are laid with common stone, of the smaller size, taken out of the land, laid so as to leave a narrow trench from 4 to 6 or 8 inches, capped with suitable stones, and well chinked in with the smallest stones and covered with straw, and the earth round up over it, and seeded. The wettest part of it, next the canal, has been well covered with chips and dirt from wood-yards and leached ashes at the rate of fifty good wagon-loads on an acre. Twice during the time, (fourteen years,) I have covered the whole with a good dressing of horse-manure, put on mostly in September, at the rate of fifty large wagon-loads on an acre, at an average cost of 50 cents a load when spread. Good stable-manure, from horses fed mostly with grain, is decidedly the best; and I prefer to put it on as soon after the hay is cut as I can, thereby keeping the ground moist, so the roots will not dry out during the hot season, and keeping them warm and in a growing state through the winter. It does well to put on coarse manure in swales and low places, in the spring, if it can be done without cutting up the land too much in getting it on the spot wanting it.

From all this, I learn that quite wet, cold land can be made dry by blind ditching, the sourness taken out with leached ashes, and made warm with dirt and horse-manure, making an abundant crop of good timothy and clover hay, where naught but short, sour grasses and noxious plants grew before. I seed with timothy only, sowing twelve quarts on an acre: clover comes in of itself, more or less, in a few years after seeding. The poorest acre there was of this land next to the canal, now rolls out a windrow of a swath, mostly clover: it has never been ploughed. I have

sowed timothy, and dragged it in and covered it at the same time with horse manure: this is the land that had the chips and ashes on it, as well as manure. It pays well to cover all newly seeded land with a light dressing of horse-manure the first fall after seeding: it takes much better. Red-top hay is good for horned cattle, and does better than timothy on all low, moist land, or that which is often wet through swales, &c.; but timothy is most decidedly best for horses.

One word in regard to the manner of securing a crop of grass or making hay. Timothy should not be cut until it will shell a little by the process of making it hay. All that is mowed in the forenoon, *in case the sun shines*, should be spread before going to dinner—the thickest of it turned over by all hands immediately after dinner. Then, let some rake round the field with a hand-rake, and pitch it in from the fences, and others mow: from 2 to 3 o'clock, P. M., put the horse-rake in motion, and men enough to cock it up after them. Hay makes in that way better than in any other that I have tried. Put up in the hot sun, in moderate sized cocks: the next day, as soon as the dew is off, it is fit to deliver. In pitching it on and off, it dries out the sweat and makes a perfect cure. This cannot be done, however, if cut too green, neither will clover or red-top cure in this manner sufficiently, without opening the cocks to the sun before delivering. I have 3¼ acres of similar land, that I have managed in a manner similar to the former: for the past three years, I have more than doubled the crop of hay and improved the quality: this year, I delivered 12 tons 98lbs. of hay from it; that is, nearly 4 tons an acre: it was well cured. I find, by several experiments in weighing hay newly made, and weighing it over in the fall or winter, that it does not shrink or fall short in weight over 8 or 10 per cent., if properly cured. It is far more profitable to put land in a high state of cultivation and keep it so, than to work it in a cheap and slovenly manner, getting but half a crop, and that of a poor quality.

I have three acres of corn ground, joining this last piece of meadow, clay and sandy or gravelly loam: it had been pastured many years. I had it broken up in the month of November, in 1846; it froze hard in a few days after: that killed the wireworm, which so often spoils a field of corn the first and, sometimes, the second season. After breaking up, it was planted on shares two years: the soil rich and mellow. They raised less than 100 bushels of ears on an acre. I took it in hand myself, put on 150 wagon-loads of manure in the spring of 1849; spread it evenly over the whole field; ploughed it once; marked it with a horse, and a piece of scantling with four pins in it, at a suitable distance for the rows apart; planted on the surface, all but half an acre of swale that was soaked from the canal, which I ridged up while wet, and planted on top as soon as sufficiently dry. That gave me the best corn on the field, where none of consequence had grown before: my rows were 40 inches apart, running east and west, and the hills only 20 inches in the row. The philosophy of that is, that it takes the morning and evening sun more, and, at noonday, less. I pulled out at second hoeing all but two stalks: it grew tall and rank, and stood the drought of that season much better than any other corn about: it did not ripen as well as thinner pieces. I planted the 12-rowed Dutton: had 125 bushels of ears an acre; but few pieces went over 100. The labor of planting and hoeing in this close manner is more than the gain. I planted it again this season, selecting the best ears of last year's crop; broke off the small ends before shelling; ploughed once, and planted the 4th of June;

rows 3½ feet each way: it ripened well, and gave me 144 bushels of ears to an acre, although planted two weeks later than my neighbors, pulled out to four stalks at second hoeing: had 21 loads of pumpkins each year, at $1 each, and 25 cents a bushel for corn in the ear delivered.

Respectfully,

BURR BUTLER.

Hon. THOMAS EWBANK,
Commissioner of Patents

Hunter, Green County, N. Y., December 20th, 1850.

Sir:—I owe you an apology for my delay in reporting my potato crop, which escaped in a good measure the rot, while my neighbors lost nearly their whole planting. I wished to see how they would keep in the cellar, before communicating further with you. I planted the most of my seed on sandy bottom land, oat stubble, dressed before ploughing with a good coat of fresh stable-manure, early in May. They were hoed twice, and, after each hoeing, I had a boy, 12 years old, pass along the rows, and scatter a handful of plaster over the stalks. The hoeing was easy, and my laborers covered the hills too deep, as I thought. This piece ripened in September; the yield was light, and about 30 per cent. of them were more or less affected by the dry rot, generally lightly, next the skin. The other was a small piece, planted on upland, naturally wet in the spring, which had been turned from the sod in 1849, and had a dressing of manure as above, and planted with potatoes. We had no rot in 1849. It was late before I could plant this piece, and having used all my manure on the other, I was unable to prepare a new field; so I ventured a second crop, contrary to my usual practice. It was hoed but once, and lightly covered. It was plastered like the other, ripened in October, and yielded a good average crop. From 3 to 5 per cent. only were affected by the rot. My neighbors, who did not use plaster, have, without exception, so far as I have heard, lost from 50 to 90 per cent. of their crops. My Irish laborers used no plaster on their patches, upon which they depended for their winter's supply, and scarcely got their seed. I feel warranted, therefore, to attribute my success to the use of plaster, (the common ground Nova Scotia,) and recommend a handful being cast upon the seed before covering, and another on the vines after hoeing. I am also confident that late planting is better than early, for winter supplies. Experience has taught me, that in all lands not subject to early frost, the growth, after the drought of harvest, is far greater in size and number than when the vines mature at or before that period. In the late planting, the tubers grow until the vines are killed by the frost. I am equally certain, that upland is better than lowland, for this esculent. I prefer a slope, where the water will not remain long on the surface. I feel well assured, that potatoes may be raised on such lands, far to the South, if planted in July or August; (I have known fair crops to be raised here, from planting the 4th of July;) and wherever public improvements are in progress, planters there will find it greatly to their interest to cultivate them. I passed rapidly through the State of Virginia, from Guyandotte to Charlotte, about the first of September, and rarely saw a potato on the table; and when I did, they were very small. In the few fields which I

saw between Stanton and the Blue Ridge, the stalks looked dry and dead. And I saw a farmer selling potatoes to the Irish laborers at the tunnel, so small as would be certainly rejected at the North. I saw one small field, on Paint Creek, which had been late planted, and never hoed: the vines were green and rank as the weeds which wellnigh smothered them. I urged the owner to attend to them, as a substitute for his short corn crop; but his hands were all boat-building, and I doubt if any thing came of it. I hope some public-spirited men will be found, who will try late planting next season south of the Potomac, and give you the result.

I am yours, respectfully,
WM. W. EDWARDS.

REMARKS.—Our correspondent should know that nothing is more common at the South than to plant Irish potatoes every month, from August to April: even north of the Potomac, in Maryland, they were grown out in the open air, in the winter of 1849 and 1850, and ready to dig, for cooking, in March and April. They need *cool weather*, and not only plaster, but wood-ashes, and either leaf, straw, or sod mould to feed the plants. Give potatoes the right temperature and moisture, and proper food, and they will do well, provided the seed is sound.—ED.

Scottsville P. O., Town of Wheatland, Monroe County, N. Y.
December 30th, 1850.

Sir:—In consequence of sickness for the last month, I have found it impracticable to answer your circular at an earlier period; consequently, the time employed on it has been so limited, that I find it so imperfect, and of so little interest, I very much doubt the propriety of troubling you with it. Although I have farmed it in this town for the last 30 years, I have never found time or inclination to go into minute calculation or investigation as to the exact cost or profit of particular modes of cultivation, and still less to experiment on different processes of fattening animals, or the exact result of such processes. My remarks will, therefore, be principally limited to a general view of the method of farming, as it actually exists in this vicinity. I also find that I have extended my remarks to too many subjects, and have, consequently, not been sufficiently particular about any to make them useful; but, such as they are, they are placed at your disposal.

The town of Wheatland is located on the Genesee River, 12 miles south of Rochester, where the Onondaga salt group of rocks crosses the river, and contains several plaster-beds; and it has been found from experience that the cultivation of wheat, clover, and corn are most suitable and profitable, and to them the attention of farmers is principally directed. Although oats, barley, peas, and root crops are necessarily cultivated to a limited extent, for home consumption, they are never depended on for market or exportation to any considerable amount. Their cultivation may be considered incidental, and limited to particular pieces of land, that happen, from the nature of the soil and previous cultivation, to be particularly adapted to an occasional crop. The land in this town consists almost wholly of what is called oak-openings, and was originally considered poor and barren, which, in fact, was the case, until the use of clover and plaster was resorted to, and which took place from 1815 to 1820, at which time the capability and fertility of the soil were fully developed, and the crops of clover, wheat, and corn were not unfrequently doubled, furnishing food for sheep and

cattle, which also increased in the same proportion, and the means of improving and renovating the soil both by pasturage and barnyard manure.

Manure.—In 1815, the price of lands, partially improved or cleared, was from $10 to $20; from that time until the present, the price has gradually advanced, selling at this time at from $50 to $70, as to quality and improvements. When the plaster first came into use, the soil was wonderfully sensitive to its effects, and the results on the clover fields truly astonishing. Such strips as happened to be missed in sowing were so small and dwarfish that they could not be mowed with the scythe; in fact, the same strips were almost equally perceptible in the succeeding wheat or corn crop. The effect did not appear to depend so much on the quantity used as upon the evenness of sowing; and when 100 pounds could be spread even, it seemed to have the same effect as double the amount; indeed, any given amount exceeding 150 pounds did not appear to improve the crops in the least.

From 1820 to 1825, the crops arrived at their maximum, and from that period to 1840 the average product did not appear to vary much, although, towards the close of that period, the average began to diminish sensibly, and the plaster to lose its effects. The land generally, and especially that portion of it well adapted to the cultivation of wheat, being summer fallowed and sown every other year, and although the clover crop was frequently ploughed in the rotation, proved too exhausting, there being little other manure used. The land appeared to tire of this continued drill of the same crops.

Since 1840, many of the farmers have adopted the three year rotation, pasturing the land the year succeeding the wheat crop, and either summer fallowing the second year, or manuring the sward in the spring, and planting with corn, which is cut up about the middle of September, and sowed with wheat, seeded to clover the next spring, to go through the same rotation. Where the three year system has been adopted for any length of time, the crops improve, and the average product increases gradually to about the old standard. I would not be understood that the above changes were confined to the mentioned dates, or that the above results would correspond to the experience of every farmer. The lands being brought successively into cultivation, and the use of clover and pasture commenced at different periods, the crops of one farmer might be increasing, while those of his neighbor might be diminishing, all depending upon the period at which the process, as described, commenced. But it is believed that the land went through something like the above process, in periods corresponding to the above dates.

The average yield of wheat, per acre, at different periods, is supposed to be about as follows:—Being in 1815, 15 bushels; in 1820, 20 bushels; from 1820 to 1830, 25 bushels, and, under favorable circumstances, as high as 35 and 40 bushels, per acre, which last was by no means uncommon. At this time, I suppose the average product to be about 22½ bushels.

The red-chaff bald, with white berry, was the variety universally used originally, and succeeded well while the land was new and fresh: it was, however, particularly obnoxious to the Hessian-fly, whenever they abounded; but as the ground became stiff and old, it gradually began to be liable to rust and winter-kill, until, from 1825 to 1830, it became quite uncertain, and was succeeded by the white flint, which proved a much hardier variety, and less liable to injury from the fly, from the peculiar solidity and hardness of the straw, and was less liable to rust. Several other varieties were intro-

duced, and cultivated to some extent, the most prominent of which were the Hutchinson, a bearded wheat, and the Indiana white, beardless: both did better than the original bald, but could not compete with the white flint. Within the last six years, the Soules wheat, a white variety, has been cultivated to some extent, and, when the tillage is good, and the land in good heart, it not unfrequently outyields the flint from 5 to 10 bushels per acre. In many localities it is fast coming into favor, and superseding the flint. It is about a week earlier, rendering it less liable to rust: it shells readily: if not harvested in season, it does not withstand wet so well, the berry being but slightly covered with chaff. The white flint, on the contrary, is but little liable to sprout in consequence of exposure, nor does it shell readily. The last two are the varieties principally in use. For the past two years, the Mediterranean has been tried to a limited extent: it is the earliest variety known here, and is said to escape injury from the weevil; but it being a red wheat, and thick hulled, our millers object to it on account of the inferior quality of the flour; and as the weevil has not made its appearance, or not to any extent, west of Seneca county, the wheat in question will not find much favor until that event takes place. It will be unnecessary to enter more into details in relation to the particular qualities of the different varieties, Professor Emmons having done it in the last volume of the Natural History of this State. The time of seeding commences, with the stiffest soils, about the 1st of September, and, on low clay lands, even as early as the last 10 days of August; but for our best upland wheat soils, from the 10th to the 15th of September is preferred. As to the preparation of the seed, we find but little necessary, the soil being so natural to, and so well adapted to the cultivation of wheat: it has hitherto been liable to but few diseases: whenever any smut occasionally makes its appearance, the application of brine, and drying in lime or plaster, is found to be a sure remedy. The quantity sowed, per acre, we find necessary to increase gradually as the land grows older; we commenced with 1 bushel per acre, of the old red-chaff, and, when the white flint was first introduced, 3 pecks were found to be sufficient under favourable circumstances: the quantity has been gradually increasing, and has arrived at 5 pecks on the most favorable localities, up to 6 and 8 pecks on stiff and lumpy clays, where much of the seed does not vegetate.

The time of harvest never varies but a few days from the 15th of July, and any pieces whose ripening is protracted, from any cause, such as late sowing, or cold, wet soil, much beyond the 20th, hardly ever escape more or less injury from rust.

Until within the last six or eight years, the usual preparation of the soil for wheat was to plough two or three times: now, the practice of turning over clover in June, and following with the harrow and cultivator, to keep the land in good tilth, and subdue any grass that may spring up until sowing time, has been fast growing into favor, and now appears to be the most approved method of preparation: if, however, in the spring, the wheat appears to be so grassy that there is little or no prospect of clover succeeding well, the stubble is generally fallowed the succeeding season, and ploughed two, or, if necessary, three times, to eradicate the grass thoroughly, and then seeded with clover to remain two years.

When the oak openings were first broken up, it was not found advisable to plough very deep, or not more so than was necessary to get under the roots of grass and brush, which was about four inches; but as the land

became exhausted at the surface, from continued cultivation, it has been found necessary to deepen the furrow gradually to 7 or 8 inches, and even to 10 inches; and as the lime and salts become exhausted on the surface, a supply is sought in the subsoil for the wants of the crops.

It may be well to mention in this connection, that the New York system of lime-rocks extends from east to west, and that we consider, and, in fact, find from experience, that the Onondaga Salt Group, and its immediate vicinity, are the best calculated for the cultivation of wheat; and that as we recede from it, either north or south, the capability and fitness of the soil for wheat decrease, until at certain distances, varying in different localities, the cultivation of wheat is nearly abandoned. As far as the debris of this rock extends, and is mixed with the soil to any great depth, it only requires exposure to the atmosphere, and a certain admixture of vegetable matter to develop its peculiar adaptation to wheat culture; and hence, the extensive fame of Genesee wheat, and the high price of its flour in the markets of the world.

There has been no remedy found for the Hessian-fly, except late sowing; and this has, of late, been but little attended to, it being found that to protract sowing much beyond the usual and approved time, exposed the crop to a more serious injury, viz. rust and shrinkage, and liability to winter-kill, the roots not being sufficiently strong and well established to withstand the continued freezing and thawing of March and April. It has also been found, that in seasons when the fly prevails, they frequently attack late sown wheat, and even barley, in the spring, and injure it far more than the early sown. It is, however, a subject of congratulation to the wheat farmer, that the ravages of the fly are steadily upon the decrease, and that at present little apprehension is felt from them, and comparatively little damage sustained. No weevil has hitherto appeared in this vicinity, or nearer than Seneca; but, as they appear to be on the march to the west gradually, we may reasonably expect to make their acquaintance in time. The average price, during 1850, at the mills, in this town, will not vary much from $1.19 or $1.22.

Estimated expense of cultivating 5 acres of wheat:	
5 days ploughing, using 3 horses and 1 man, at $2.25 per day...	$13.25
Wear of plough and points.....	1.00
1 day harrowing, 1 team and boy, and use of harrow.....	2.00
2 days cultivating " " " cultivator.....	4.00
1 day drilling in wheat, " " " drill.....	2.25
Seed wheat, 5 pecks per acre being sufficient, drilled, at $1.19 per bushel.....	7.45
Harvesting and drawing to barn per acre, $2.....	10.00
Use of land one year, allowing pasturage, spring and fall, for its use the seasons that the wheat is sowed and harvested, $4. per acre.....	20.00
	$59.95
Estimated yield, 22½ bushels per acre, at $1.19 per bushel.....	$133.87
Deduct expense.....	59.95
Profits on 5 acres.....	73.92

Or, on one acre, nearly $14.75. Or, if the whole is done well, or in good season, we may safely calculate on 25 bushels per acre, which would increase

the profits nearly $3 per acre, or $17.75 per acre, admitting the straw and chaff will pay for threshing and carting to mill.

The cultivation of corn is supposed to be increasing, and taking the place of root crops to a great extent: it is considered secondary to wheat, principally used for home consumption, and seldom for exportation: there are several varieties in use; but the early 8 and 10-rowed yellow and white, are preferred on wheat soils. Corn is usually cut up by the ground, and followed by wheat, as already mentioned. The yield per acre is exceedingly various, depending upon the adaptation of the soil to the crop, and the amount and quality of the manure used; indeed, the land can hardly be too rich: under ordinary or rather unfavorable circumstances, the yield may be 30 to 40 bushels; and under favorable circumstances, depending on season and cultivation, it will go as high as 60 to 70 and even 80 bushels per acre.

It is difficult to arrive at correct estimates of the cost of raising, although such estimates are frequently made, so much depending upon the natural qualities of the soil, as well as upon previous cultivation and manuring.

The mode of cultivation most approved here is to apply the manure of the previous winter on clover sward: if the land is dry and loamy, plough once from the 1st to 15th of May; roll, harrow, and cultivate, and plant as soon thereafter as possible; or, if a stiff soil, inclining to clay, manure and plough in the fall, pulverize from the 15th to 20th of May, planting as soon after as possible. At one time, it was not unusual to plant about the 1st of May: it is now discontinued, it being found that it increased the labor of after cultivation, and gave time for the growth of grass and weeds before the first hoeing, and the corn being very liable to injury from late frosts. Corn is usually fed to hogs in the ear; for cattle, it is always ground.

Oats are considered an exhausting crop, and are also cultivated mostly for home use; the stubble is seldom used to follow with wheat, and very rarely succeeds when tried. Average yield, under ordinary circumstances, 30 bushels; but when the season is favorable, or we have seasonable rains, they will yield 40 to 50 bushels: the land for oats is hardly ever ploughed but once: average price, 30 or 34 cents.

Barley is but little cultivated on our best wheat soils, and is confined principally to loamy soils, containing a good supply of vegetable matter, or on well manured corn or potato ground: it does not succeed on poor or grassy land: under favorable circumstances it may yield 40 bushels per acre, but more frequently less: it is almost wholly sold to brewers, and seldom fed out on the farm. It is not considered an exhausting crop, and is generally followed by wheat. The price per bushel generally 50 to 60 cents: this season it has sold at 75 in Rochester.

Rye not cultivated.

Peas are raised to some extent on loamy and moist localities, and frequently do well there, yielding about 30 bushels per acre; but seldom succeed on dry, light soils: they are generally followed by wheat, which generally succeeds well after them. When the pea crop does well, it is useful in subduing grass, leaving the land light and in good condition, and is therefore considered an ameliorating rather than an exhausting crop. The green crop is never ploughed in for manure. When cultivated extensively for a few years in succession, they become so infested with bugs that farmers are compelled to abandon their use for a time: they are fed to hogs either in the straw, or soaked, or boiled, and are considered equivalent to corn: they

are seldom sold off the farm, except in the spring, for seed, and frequently sell at $1 per bushel.

Beans have been tried to a limited extent as a fallow crop, but did not appear to succeed, probably on account of the expense involved, their cultivation being now mostly limited to family use.

Clover and *timothy* are the only grasses used for cultivation; and meadows of said grasses, except in cases of unseasonable droughts, will yield 2 tons per acre. The principal and almost only fertilizer used is plaster, either sown with the seeds in the spring, or the following spring, early in May: the seeds are mixed, when sown in the spring, 6 or 7 pounds of clover to from 2 to 4 quarts of timothy to the acre. Of late years, the practice of sowing the timothy in the fall, and immediately after the wheat, has been adopted, the clover in the spring, from the 1st of March to 1st of April, and is considered an improvement, as timothy sowed in the spring frequently failed in consequence of drought. The expense per acre would be about as follows, viz.:—

Cost of seeds	$0.80		
150 lbs. of plaster, and sowing plaster and seeds	0.70		
Mowing 2 tons per acre	1.50		
Raking and drawing, &c.	2.50		
Interest on land	4.00	expense	$9.51
Cr.			
By 2 tons hay ..... at $7.50			15.00
Profit per acre			$5.49
Or $2.75 per ton.			

Wool-growing, at present prices, disconnected with wheat-raising, and at the present price of land, would not pay; but a certain amount of sheep may be kept on wheat farms to advantage, to consume the clover, and consequently enriching the land, and also to reduce wheat straw by feeding on it, trampling it fine, and mixing with their manure. Sheep may be wintered on straw and chaff, with a small daily additional allowance of ½ a gill of corn, or its equivalent in other grain, successfully, and averaging 3½ pounds fine wool per head: in lieu of the grain, 1½ pound of good hay may be substituted; indeed this is a very common practice with all except lambs, which require plenty of good hay. Having no experience in coarse-woolled sheep, I cannot judge of the comparative profits of each.

Farmers here do not keep many more neat cattle than are required for the use of the farm, and none follow dairying as a principal business. Cattle, after the first winter, are principally kept on straw and chaff: the straw being stacked near the barn, they are allowed to run about it, and a sufficient quantity being daily cut off the stack and spread about the yard and sheds during the winter, to be converted into manure; a certain amount of cattle or sheep, or both, being necessary for that purpose, and as the straw is of but little or no value here for any other purpose; we do not estimate the expense of wintering the number requisite for that purpose as costing us any thing, but being rather an advantage. Calves, milch-cows, and working-cattle are either stabled or have separate yards, and are fed, in addition to the above, with hay or cornstalks. The cost of rearing a calf the first summer will be about $5, the first winter $5, the two succeeding summers, say 60 weeks pasturage, 18 cents per week, $10.80, making $20.80. Steers,

in fall, at 2½ years old from the pasture, ordinarily sell at about the amount, and, if kept through the winter until 3 years old, (if kept as above described,) would still sell for about the same amount, not being in so good condition. Cows may be valued in the fall, at from $16 to $18; in the spring, from $22 to $25. Durhams and Devons, and their crosses, are the cattle usually raised, and of the two breeds, pure, the Devons are generally preferred, both on account of their beauty and their being the most hardy and easiest kept. Having but little experience in the fattening and management of cattle, I am not competent to give you reliable information. Of late years, the facility of sending fresh beef and pork to Eastern markets by railroad, has considerably enhanced their price. I have seen good beef sold in Rochester at $2.50 per cwt.: it now sells at $4 and $4.50.

As to *hogs*, new varieties are so frequently introduced, and are so quickly mixed up, it is difficult to determine the best breeds; farmers vary much in opinion: I have been the best pleased with what has been called the Mocha, and their crosses. The cheapest method of fattening, and the one generally adopted here, is to commence as early as a supply of potatoes and apples can be got, boiling them together in such proportions as our supplies of each will admit, adding some meal or middlings after boiling; the more the proportion of apples, the greater the quantity of meal required: pumpkins may be added as soon as they come to maturity, but they are inferior to either of the former: this course is followed until with a few weeks (2 to 4) of killing time, when corn in the ear or meal is used to harden the pork. The Onondaga coarse or evaporated salt is used for packing pork, little or no bacon being made.

Root crops of all kinds, except potatoes, are now but little cultivated. From 5 to 10 years ago, the cultivation of ruta baga, beets, and carrots was pretty extensively tried by our most enterprising farmers; but, owing to the expense of cultivation, and the uncertainty of the crop, arising, principally, from the prevalence of unseasonable drought, they have gradually been disused, it being found that when large breadths had been planted, and stock provided specially for their consumption, the crop so frequently failed that it subjected the farmer to much loss and inconvenience, and the corn crop has almost uniformly taken their place, as being more reliable. Still, with proper preparation of the soil, and the present improved demand for meat, their culture may be revived with more success.

Irish potatoes are cultivated to a considerable extent. The most approved method of preparation and tillage is the same as corn, except that the manure ought to be finer and better rotted; they do best planted in hills, not less than 2½ feet apart each way; a handful of plaster and ashes, half of each, applied to each hill, either before or after covering, is frequently used to advantage. The most prolific variety in use is the Merino; they are not considered as nutritious as the other varieties, and are used principally for feeding out. Some years ago, the Rohan potatoes excited much attention; but, when tested, were disapproved of and discontinued. The flesh-coloured (Plate II. of Professor Emmons) is much in use, and is more firm and better for the table than Merino, but second as a bearer. Next best in yield is the long and round pink-eye; then follows the Mercer as a yielder. The Carter potato is now being introduced; it is a late variety, superior to any other for table use; its yielding qualities are not sufficiently tested as yet to form correct conclusions. I have raised it, to a limited extent, the last two seasons; it has suffered less from the rot than

any of the above varieties, which were planted in the same field. The quality of the above varieties for table use improves from the first to the last mentioned, and from the last to the first as bearers.

The raising of potatoes has been curtailed, on account of the prevalence of the rot, for the last 5 years, and they have suffered from it the last season probably more than ever before. The average crop is estimated from 160 to 170 bushels per acre. Cost of production, 13 cents per bushel; usual price at the time of digging, 25 cents; profit per acre, taking the average at 170 bushels, would be $20.

Having paid but little attention to orcharding, and my communication being spun out to such a length, I will forbear saying any thing on the subject, and here conclude.

It will be observed that the above estimates fall far short of the results published in the reports of our agricultural societies, which, since writing the above, I have partially examined: mine have been made without reference to any other, and from my own observation and experience, if any thing, they may be too low; but it is confidently believed that they will not vary materially from the general results as they actually exist. When a farmer contends for a premium, he selects his land in reference to the intended crop, cultivates with extra care, and, perhaps, is assisted by adventitious circumstances, such as a seasonable and, perhaps, limited shower of rain, that does not extend to many of his neighbors; and, if successful, he naturally endeavors to make the most of it, in order to exhibit his skill and the superiority of his soil over that of his neighbor.

Very respectfully yours,

DAVID McVEAN

Hon. THOMAS EWBANK,
Commissioner of Patents.

Allenton, Washington Co., Rhode Island, Dec. 23d, 1850.

Sir:—Having been kindly furnished with a circular from the Patent Office, requesting information upon various subjects connected with agriculture and rural economy, I proceed to reply (though incompetent) as far as the questions have a local application, and shall confine myself to some of the most important farm products and operations. There are but few kinds of business which require a closer personal attention and more skill in order to succeed than that of farming. The purchasing of a large portion of his cattle, sheep, and swine; the feeding and preparing them for the butcher; the rearing of calves, lambs, pigs, poultry, and eggs; the making of butter and cheese; selling milk; raising vegetables and fruits of various kinds for market, with some of the more staple products—constitute, in part, the occupation and resources of the farmer.

The land is generally uneven, both in surface and quality, and presents many varieties of soil even within the same field. No uniform rule of practice can well be applied. Each one must determine for himself the best mode of operations. The great secret of success consists in the judicious preparation and liberal distribution of manures. It is the foundation upon which every farmer must rely for a profitable return for his labor and capital employed. By the liberal use of manure and thorough cultivation, the

crops are, comparatively speaking, placed beyond the influence of unfavorable seasons and other vicissitudes to which they are so subject.

Indian corn forms one of our most valuable crops, regarded both as forage for stock of all kinds, and as food for the support of man. It must be admitted to hold a rank far above any other plant known in husbandry. The soil best adapted for raising this crop is the sandy loam; although it thrives well on all soils, if well manured, excepting the cold and wet clay soils. The varieties most esteemed here are the large and small white-cap corn. The former for strong and rich, and the latter for poor and light soils. They always accommodate themselves, in a remarkable degree, to the soil and the seasons, always maturing and yielding, according to land and cultivation, from 10 to 60 bushels per acre. Cost of production, from 20 to 75 cents per bushel, not including the cost of manure, which will be more than balanced by the additional quantity of fodder obtained during the several years which the manure continues to exert an influence. The largest yield costs the least per bushel. One of the best methods for raising this crop is to allow the grass to grow upon sward land till about the 25th of May, then spread 20 ox-cart loads of good, unfermented stable manure to the acre, and plough the whole under to the depth of eight inches; roll it well, mark out with the plough 3½ feet apart, and intersect the furrows at right angles with a chain, the same distance apart for the hills, put a small quantity of fine compost in each, then drop in four grains and cover deep. The whole work should be quickly performed. As soon as the corn can be well seen, pass a fine-tooth harrow between the rows, each way, and follow with the hoe to clear away, leaving no hill. Soon after this, let the cultivator pass in like manner; also follow with the hoe, leaving but small hills. The third hoeing should take place before it tassels out, avoiding large hills, as before. As soon as the corn is well glazed, cut it up close to the ground, and put up in small shocks. If the land could be made smooth, it would be a great saving of labour to plant with a machine. Tarring the corn, before planting, is a sure preventive against the depredations of birds. The past has been a favorable season for corn.

Rye is well adapted to our light, poor soil, and, with a little manuring, will yield from 12 to 30 bushels per acre: cost per bushel, from 20 to 50 cents, not including manure, which will be paid for by the straw, it being worth from $6 to $7 per ton.

Oats and *barley* are cultivated only to a small extent, and are considered very exhausting.

Beans do well on light soil. Yield, about 12 bushels per acre. Cost of raising, $1 per bushel.

Hay is an excellent and profitable crop on moist land, if supplied occasionally with suitable manure. Fish, spread on the land after the crop has been taken off, at the rate of 50 barrels to the acre, will produce astonishing effects, frequently quadrupling the next year's crop. Stable manure will do well also. Moist land should always be selected for this crop, when practicable, and the dry lands for tillage. The past year has been very favorable for grass—at least 25 per cent. over that of the year before. The quantity per acre varies from ½ ton to 2½ tons, and it is worth about $3 per ton to cut and secure it in good order.

Potatoes.—This is the most valuable of our root-crops, and its qualities are beginning to be better appreciated as the difficulty and uncertainty of raising become more apparent. The past season has proved to be the most

fatal to this crop. It has also been remarkable for the unusual quantity of rain. These circumstances may not be without their benefit in assisting to determine the cause of the disease, and thereby settle the question that has given rise to so many unprofitable and speculative theories. It may not be out of place here to suggest what has appeared to me evidently to be the cause; and that is, an excess of heat and moisture, combined with ammonia, a highly fertilizing salt, well known to exist in all rich soils and manures. The rot has always been found to be excessive on highly manured and wet land, and in a season of high atmospheric temperature; while in poor, dry soils, it rarely, if ever, makes its appearance. Notwithstanding its liability to decay, it continues to be extensively cultivated, and proving to be, in many instances, where it is only partially destroyed, the most profitable crop raised by our farmers. Yield, from 50 to 250 bushels per acre. Price per bushel, 50 to 80 cents. To those near a market, or on the waters of the Narragansett Bay, the Mercer or Chenango is the best variety, more especially on light soils. The ground should be well ploughed twice before planting. A little plaster on the seed in the hill is a good manure for the potato; also, a little manure is good with the plaster, on light soils. Wet land should be avoided for the Mercer variety, and, perhaps, for most others.

Onions and *carrots* are raised on the same ground, in alternate rows, producing full crops of each. The onions come to maturity early, and are gathered, thus leaving the carrots in full possession until they mature. This is considered a beneficial occupation of the land. Roots, of various kinds, are beginning to be cultivated for the use of stock in winter.

Stock-breeding has been much neglected in this county. It is to be hoped, however, that some of our enterprising farmers will make the experiment, for, I have no doubt, it would be a profitable undertaking, if well conducted. They should avoid the imported stock, which, by extreme care in crossing, together with high keeping, have been brought to the highest degree of perfection, and which would, without this same care and high keeping, probably degenerate, as they have done in other cases. But, by careful and judicious crossing with some of our best native cattle, there might, no doubt, be a breed produced that would be valuable both for work, the dairy, and the shambles, and which would be better suited to our climate, and better prepared to endure the careless treatment common among us. Feeding stock for beef is practised to some extent by some of our best farmers. In selecting animals for this purpose, care should be taken to procure those that will fatten readily; and when the business of feeding has commenced, it should be attended to faithfully, for the sooner it is done the more profitable it will be.

Sheep have decreased in number very much, of late. They are now kept, not so much for wool, as for the rearing of lambs, which are sold to the butchers at about three months old, and bring about $2 per head. The coarse-woolled, native breeds are the best for this purpose.

Hogs cannot be raised and fattened at the present price of pork, with any degree of profit, beyond what are required to consume the offal of the farm, dairy, and kitchen. Breeding-sows are kept for raising pigs, and produce two litters a year, which are sold, at about 8 weeks old, for $3 each.

Poultry.—Washington county has become quite celebrated throughout the country for its fine-flavored poultry. The quantity annually produced is large, the greater portion of which is sent to Boston. All our farmers are engaged more or less extensively in this business. Some devote almost their whole attention to this branch of industry.

Manures.—The collecting and composting of manure should be attended to by all means, whenever it is practicable. Peat taken from the swamp and composted with stable manure, in the proportion of one of manure to four of peat, and allowed to remain until a slight fermentation takes place, makes an excellent manure for all light soils, and for almost all crops. Leached ashes mixed with peat, in proportion of one to two, makes a good manure also. Stable manure is the best for top-dressing on grass lands and for corn, to be ploughed under in an unfermented state. Fish manure is very active, and, whenever it can be procured at a reasonable rate, will pay well for the expenditure. The stable is our main dependence for manure, and should be kept well littered with straw, eel-grass, lowland hay, and peat, kept dry for that purpose.

Dairy.—Narragansett was formerly one of the most celebrated dairy districts in New England. The business is now pursued to some extent, and, where the land is suitable, is, perhaps, one of the most profitable branches of husbandry. The annual amount realized from each cow, including the calf, is about $35. Ice is used in all good dairies for cooling the cream, and preserving the butter till marketed. Price per pound, 22 to 25 cents. Cheeses of inferior quality are for the most part made, and sell for about 5 cents per pound.

Fruits of all kinds are receiving increased attention, and are beginning to be extensively cultivated, not only as a source of profit, but also for the decoration of the homestead. They are also highly esteemed as a healthy and delicious food. Many of the old orchards of common fruit are fast going to decay, and others are being planted to supply their places, great care being had to procure esteemed varieties. The best variety of apples, for this district, is the Rhode Island Greening. It is unsurpassed for all purposes, is an early and constant bearer, and the trees are long lived; some of which are now in a bearing condition, being 100 years old. It is much finer flavored, the flesh is firmer, is of a deeper green color, and keeps longer when produced in this vicinity, than when produced west of the Connecticut River. In cultivating an orchard of apples, pears, or peaches, care should be had to keep the ground loose, and deeply ploughed and under tillage, till the trees are well grown and nearly shade the ground. It should be lightly manured every year with good compost manure. No grass, rye, oats, or barley should ever be allowed to grow in an orchard. Some root crop, alternating with Indian corn, will be best. June is, perhaps, the best month for pruning an orchard, though it may be done at any season of the year. The heads should be cut out and formed while the trees are growing, and little care will be necessary in after years.

Very respectfully yours,

CHARLES ALLEN.

Benton, Elkhart County, Ia., Dec. 24th, 1850.

Sir:—In answer to certain questions contained in your Agricultural Circular of the 26th of August, 1850, I proceed according to the best of my abilities.

Wheat.—The Mediterranean has been sown, of necessity, for a few years past, on account of the ravages of the Hessian-fly, for other kinds are destroyed, while this escapes. It is not a very productive wheat. Its average product is estimated at 15 bushels per acre. The kinds in use, and most esteemed, when not disturbed by the fly, are the Wabash, Hutchinson, red, and white chaff bearded. The average product is 20 bushels per acre. The time of seeding is from the 1st to the 20th September, and of harvesting, from the 4th to the 15th of July. No preparation of seed. We usually plough twice and harrow in the seed. It is better to plough deep the first time, (say 8 inches,) and the next time not so deep. The best fallow land is that on which corn grew the previous year. If the land receives good culture, we consider our yield increasing. We know of no remedy for the Hessian-fly but to sow the Mediterranean wheat. We have no weevils. Average price per bushel, 56 cents.

Corn.—The variety most esteemed here is white with a red cob, though a yellow corn, lately introduced here from South Carolina, is the most productive; but it is sometimes injured by frosts. It is, however, becoming better adapted to our climate, and, I think, it will soon be the most profitable kind to raise. Our old varieties averaged 45 bushels, and the last-named, 65 bushels per acre. The best system of culture is, to plough the ground deep in the spring, furrow and cross it about 3½ feet apart, plant 3 or 4 grains in a hill, harrow, and then plough 3 times, and hoe at least twice. Average price per bushel 20 cents.

Oats.—A fair crop is about 30 bushels to the acre. One bushel and a peck are sown. Average price, 18¾ cents.

Neat Cattle.—Owing to our dry, sandy soil, grasses are not productive, consequently, we raise but few cattle. Three years' old steers are worth from 10 to 12 dollars. Good milch-cows, with their calves, in the spring, average $12, and in the fall, $10. Native stock suits our climate best.

Sheep.—The raising of sheep has attracted some attention of late, owing to there being a demand for wool from abroad. Coarse wool sells for 31 cents per pound. The finer kinds are not much grown here. Sheep do well.

Hogs.—Not much more pork is raised here than is necessary for home consumption. Average price, $2.75 per cwt. Our method for putting down pork is to salt it well, and, after it has taken the salt, hang it up and smoke it, and when well smoked, prepare a mixture of ground black-pepper and salt, and rub it well all over, which prevents the bugs from disturbing it.

Potatoes are raised only for home consumption. Varieties, the Meshanock and Mackinaw, which yield well. Mode of culture, manure the land, plough and harrow it, then furrow and plant four potatoes in a hill, about feet apart; afterwards harrow and plough two or three times, and hill well with the hoe.

Fruit.—Great attention is paid to the culture of fruit. We frequently have apples which weigh from 16 to 22 ounces, though our orchards are young. The "never-fail" and bellflower are the best kinds for keeping.

The best time for transplanting and grafting is in the month of April. My information upon the other subjects of inquiry contained in your circular is so limited, that I think it unnecessary for me to attempt to answer further.

I am yours respectfully,

JOHN JACKSON.

Mount Pleasant, Clockville, Madison county, N. Y. Dec. 17, 1850.

Sir:—Your Agricultural Circular was duly received. I shall be able to reply to but few of the questions it contains.

Dairy Husbandry.—The average yearly produce of butter, per cow, in this section, taking altogether, would not much exceed 100 lbs.; of cheese, 200 lbs. There are extra dairies, however, which will give over 200 lbs. of butter per cow. One pound of butter is generally considered equal to two of cheese; yet, I think, two pounds of cheese can be made from less milk, and with less expense, than one of butter. The average price of butter, the past season, has been 13 cents per lb., and cheese, 5½ cents.

Neat Cattle.—The cost of rearing, until three years old, is about $10, for the first year, and $8 for the second, and $10 for the third, making in all $28. The usual price, at that age, is $30 for a steer, and $20 for a heifer, in the spring. The value of good dairy-cows in the spring is $25; in the fall, $16. Extra cows are worth more, while many are worth less. As to whether a given amount of food will make more meat in a Durham, Devon, or Hereford animal, than in a native, I am fully convinced, so far as the Durhams are concerned, it will; but cannot say with regard to the others, having had no experience with them. There has been, for years past, too little regard paid by farmers in general to neat cattle. When it is considered that the expense of rearing an inferior, common, or superior animal is nearly the same, it is astonishing that we have not more superior animals. In the estimate above, I have given as the price of a three-year old heifer, $20. A good grade heifer, say half Durham, (or a cross on any other of the improved breeds,) at two years old, would bring as much or more, and a saving, by the owner, of one year's keeping. A thorough-bred animal, at two years old, would bring from $100 to $300, and could be reared at about the same expense as a native animal. It is, however, the first cost that stands so much in the way of improvement; yet, when it is considered with what ease, and comparatively small expense, grade animals can be obtained in most sections of this country, and this grade be again improved by the introduction of more pure blood, the farmer who neglects to improve his stock has no excuse. It has now been little over half a century since the first Durham cattle were brought to this country; yet they were not imported to any great extent until some sixteen years since. The rapidity with which they have since found their way into almost every section of our country, and the universal satisfaction they have given, in almost every instance, when fairly tried, proves their superiority over the native cattle. In 1846, E. P. Prentice, Esq., of Albany, New York, slaughtered a Durham ox, five years old. His live weight was 2546 lbs.; dead weight, four quarters, 1688 lbs.; loose tallow, 260 lbs.; hide, 126 lbs.; making the whole net weight 2074 lbs., or a shrinkage of only 472 lbs. in an animal weighing over 2500 lbs. The shrinkage in our native cattle is allowed to be one-third;

that is, a native animal, weighing 1200 lbs. alive, is expected to weigh 800 lbs. when dressed. They are as superior, in many instances, for the dairy, as for the shambles. In 1844 the New York State Agricultural Society awarded the first premium to George Vail, Esq., of Troy, New York, for the largest quantity of butter made from six cows, in thirty successive days. The quantity made was 265 lbs. 10 oz. These cows were all thorough-bred Durhams, and had no feed, during the trial, but grass pasture. In the Patent Office Report for 1848, page 397, mention is made of one of my short-horned heifers. I have given this cow, during the past season, a very thorough trial, as regards milk and butter. She gave, on grass feed, in 71 days, 3584 lbs. of milk. In favorable weather, 19 lbs. of her milk would give one pound of butter. She made, during ten days in June last, (very unfavorable weather,) 20 lbs. 4 oz. of butter; during ten days in August, 19 lbs. 14 oz.; her feed being grass only.

I might give many other examples, showing their great value, both for the dairy and the shambles, but fear it would occupy too much space in your Report.

I would not be understood, by the foregoing, that the Durhams should be introduced exclusively into all parts of our country; but I do contend that some of our improved breeds should be much more generally adopted. Let farmers also pay greater regard to selecting, secure the best animals within their reach, give them proper care and attention, and millions of dollars will be added to the real wealth of our country.

I am, sir, yours truly,

S. P. CHAPMAN.

Sir:—As to the inquiries in your circular, respecting agriculture, I shall be very brief, knowing, as I do, that there are so many who are extensively engaged in that business, and who possess so many more advantages than myself, that I think it would be unwise for me to say much on that subject; but will give you my views on a few points, which, if worth noticing, well—if not, as well.

Wheat.—Very little is grown in the easterly part of Connecticut: I do not know of one bushel having been raised in this town last season. The easy transportation from the West, by railroad, for flour, reducing the price so low, and the high price of labor, have put a stop to growing it almost entirely.

Corn is a staple article with us, our common brown bread being made from a mixture of corn and rye meal. As to varieties, the yellow is preferred. In Rhode Island, the white is mostly used, especially for johnny-cakes, &c. The average product, per acre, is 35 to 40 bushels. The expense of raising the same would be, for labor, $7, and for manure $10, which is spread broadcast. For feeding, we grind with the cob, and cook it. Twenty bushels of corn, consumed by hogs, will produce 10 loads of manure, which, spread on an acre, will add to the crop from 25 to 30 per cent. I think a great addition may be made to the manure of hogs, both in quality and quantity, (when it can be done,) by letting the refuse matter of the kitchen and sink run into the hog-yard, and by throwing in wash weeds, &c., and let the hogs muzzle it. Perhaps not more than one-third of our clover crop is used for fodder; it is worth $5 per ton. The remaining

two-thirds are saved for seed, which Windham county is somewhat noted for, as Wethersfield is for onions. We get from 140 to 180 pounds of seed to the acre: the price is from 10 to 15 cents per pound: the miller has 10 per cent. for getting it out: the straw is worth but little, except for manure. I have received for the seed, per acre, more than $33 net profit. The cultivation of apples has received uncommon attention for a few years past, more as to quality, than quantity, for very few are planted out without being budded, or grafted, which is *vice versa* from what it was 40 years ago. Double the quantity of apples has been sent to market the present year than in any previous year; and more within five than ever before. Good apples have sold, the past fall, for 40 to 60 cents per bushel. I think an acre of good land, with good cultivation, would yield from 200 to 300 bushels. The Roxbury Russet, which is an annual bearer, I consider fully equal to any other variety for winter use; and for fall use, the Royal Pound apple, a native of Connecticut, also a good bearer.

I send you a set of meteorological tables, as requested in your circular, only, perhaps, more extensive than your request, which I thought required only one year; but, as far as my knowledge extends, I do not recollect seeing a single table or page on the subject from Connecticut. I thought I would give the result of my observations for several years past. I think they are correct, and do not extend too far back to give the general information of the heat, cold, wind, rain, and snow. It would be very agreeable to have the tables published entire; but they are at your disposal: please arrange them in such order as you think best. The tables are so plain as to need no explanation.

Yours respectfully,

JONATHAN CLARK.

P. S. I have no rain-gauge.

Meteorological Tables for the Village of Goshen, in Hampton, Windham County, Connecticut; N. latitude 41° 47′ 49″; *longitude* 72° 7′; *elevation above tide-water,* 561 *feet; and* 19 *miles north of tide-water. By* JONATHAN CLARK, *County Surveyor.*

1840.	Clear days.	Cloudy all day.	Part cloudy, part clear.	Rain or snow, or both, all day.	Rain or snow part of the day.	No. of days on which snow fell.	Depth of snow in inches.	Number of thunder showers.	No. of days all or part foggy.	DIRECTION OF WIND. N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W
January	19	2	5	2	3	6	20½	...	2	18	1	4	...	...	2	2	4
Feb.....	11	1	3	4	9	3	5½	...	6	9	...	8	2	...	...	9	...
March...	17	3	4	4	3	3	11¾	...	1	10	...	8	...	...	3	4	6
April ...	18	3	5	3	1	3	8	...	...	13	...	...	2	1	1	10	3
May.....	20	7	...	2	2	1	2	...	...	11	...	8	2	...	...	9	1
June.....	16	5	3	...	6	...	...	2	...	14	2	6	1	...	1	4	3
July.....	17	6	2	3	3	...	...	3	2	10	1	5	...	...	...	11	4
August .	19	2	2	1	7	...	...	4	1	18	...	...	...	...	...	13	...
Sept.	18	2	7	1	2	...	...	1	2	14	...	2	...	...	...	11	3
October	16	2	5	5	3	1	4	...	2	13	1	4	3	...	1	7	2
Nov.	15	8	1	2	4	4	10⅓	...	...	12	...	15	...	...	...	1	2
Dec.	21	3	...	2	5	...	16	...	...	21	...	6	...	...	...	2	2
Total	207	44	37	29	48	21	78¼	10	10	163	5	66	10	1	8	83	29

Last frost in the spring, April 28th.
Last snow in the spring, April 1st.

First frost in autumn, September 22d.
First snow in autumn, November 26th.

1841.	Clear days.	Cloudy all day.	Part cloudy, part clear.	Rain or snow, or both, all day.	Rain or snow part of the day.	No. of days on which snow fell.	Depth of snow in inches.	No. of thunder showers.	No. of days all or part foggy.	DIRECTION OF WIND.							
										N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	14	4	4	9	1	6	12½	...	2	11	2	5	2	1	1	6	3
Feb.	18	5	5	2	...	5	13	...	...	14	2	5	1	...	...	3	3
March...	20	3	2	5	1	5	11	...	...	16	...	8	...	...	1	4	2
April	9	6	1	5	9	3	14	1	1	9	...	10	...	1	2	8	...
May	16	2	4	2	7	1	½	1	4	14	...	5	1	1	1	5	3
June	17	4	3	3	3	...	...	3	3	3	...	6	...	...	...	10	11
July	19	4	1	2	5	...	...	6	2	15	...	3	...	...	...	7	6
August..	16	6	1	3	5	...	...	3	6	3	...	6	1	...	...	14	7
Sept.	14	8	1	2	5	...	...	2	5	6	6	11	...	...	...	5	2
October	17	3	5	3	3	1	2	...	1	15	1	8	...	...	...	5	2
Nov.....	18	3	2	2	5	2	5	...	1	15	1	5	1	...	...	2	6
Dec.....	9	7	6	2	6	4	14	...	...	11	1	2	...	...	3	8	6
Total	187	55	35	40	50	27	73	16	25	132	13	74	6	3	8	77	51

Last frost in spring, May 20th.
Last snow in spring, May 3d.

First frost in autumn, September 30th.
First snow in autumn, October 3d.

1842.	Clear days.	Cloudy all day.	Part cloudy, part clear.	Rain or snow, or both, all day.	Rain or snow part of the day.	No. of days on which snow fell.	Depth of snow in inches.	No. of thunder showers.	No. of days all or part foggy.	DIRECTION OF WIND.							
										N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	19	3	3	2	4	3	10	...	1	7	...	5	...	1	...	9	9
Feb.....	18	2	1	5	2	4	8½	1	1	13	...	4	...	1	...	6	4
March...	19	3	2	2	5	2	8	2	1	8	1	5	...	...	...	8	9
April	16	3	2	7	2	...	...	...	...	9	1	14	...	1	...	2	3
May.....	16	4	2	3	6	...	...	1	3	3	1	5	...	1	1	15	5
June	18	5	1	5	1	...	...	2	3	5	1	4	...	1	...	15	4
July.....	15	5	1	4	6	...	...	7	2	3	1	3	1	...	1	17	5
August	13	4	...	5	9	...	...	7	3	4	1	10	2	3	1	4	6
Sept.	16	5	3	5	1	...	...	2	...	11	...	5	...	1	1	9	3
October.	24	1	3	1	2	1	1	1	1	14	...	6	...	...	1	5	5
Nov.....	21	1	...	4	5	4	10½	...	...	6	2	10	...	1	1	1	9
Dec.....	16	5	1	2	7	8	12	...	...	13	1	7	...	...	...	3	7
Total	211	41	19	45	50	22	50	23	15	96	9	78	3	10	6	94	69

Last snow in spring, May 31st.
Last frost in spring, April 16th.

First frost in autumn, October 6th.
First snow in autumn, October 20th.

1843.	Clear days.	Cloudy all day.	Part cloudy, part clear.	Rain or snow, or both, all day.	Rain or snow part of the day.	No. of days on which snow fell.	Depth of snow, in inches.	Number of thunder showers.	No. of days all or part foggy.	DIRECTION OF WIND.							
										N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	15	9	2	4	1	4	7	...	7	10	...	11	...	...	...	6	4
Feb.....	17	3	3	3	2	5	25	...	2	3	2	7	...	1	...	3	12
March...	19	1	1	6	4	8	15	...	...	11	3	6	...	2	...	3	6
April ...	16	3	1	7	3	3	7	...	1	4	3	9	1	1	1	5	6
May.....	14	7	6	1	3	...	...	1	...	6	2	8	...	...	1	7	7
June.....	19	1	3	2	5	...	...	5	4	6	...	3	...	...	...	16	5
July	17	2	4	3	5	...	...	4	1	9	2	4	...	1	...	10	5
August .	14	4	3	5	5	...	...	3	4	6	3	6	1	...	...	6	9
Sept.	18	5	4	1	2	...	...	2	1	6	...	8	1	...	...	2	13
October	15	4	2	3	7	2	4½	...	1	3	1	4	...	1	1	5	16
Nov.	16	1	4	4	5	1	...	...	...	11	2	6	...	1	...	8	2
Dec.	12	6	4	2	7	8	20	...	...	7	...	10	...	..	1	4	9
Total	192	46	37	41	49	31	78½	15	21	82	18	82	3	7	4	75	94

Last snow in spring, April 19th.
Last frost in spring, June 2d,
so that it killed vines.

First frost in autumn, September 1st.
First snow in autumn, October 28d.

1844.	Clear days.	Cloudy all day.	Part cloudy, part clear.	Rain or snow, or both, all day.	Rain or snow part of the day.	No. of days on which snow fell.	Depth of snow, in inches.	Number of thunder showers.	No. of days all or part foggy.	DIRECTION OF WIND.							
										N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	18	2	2	4	5	9	11	...	1	15	2	5	1	...	...	6	2
Feb.....	19	1	4	3	2	5	16¾	...	...	9	2	9	...	...	...	3	6
March..	14	5	1	7	4	7	20	...	2	4	3	10	...	1	1	9	3
April....	18	2	6	1	3	...	...	...	...	4	1	7	...	3	1	5	9
May.....	15	2	2	2	10	...	...	...	1	9	...	2	...	2	2	10	6
June	17	2	6	2	3	...	...	3	...	8	...	5	...	...	...	12	5
July.....	13	5	2	5	6	...	...	5	1	7	...	9	...	...	1	9	5
August .	12	4	6	2	7	...	...	6	...	8	1	6	...	...	...	13	3
Sept.....	20	5	1	3	1	...	...	1	...	4	1	12	...	1	2	7	3
October	17	4	1	4	5	1	½	...	...	8	4	9	...	...	...	8	2
Nov.....	16	3	2	4	5	2	4	1	...	13	1	6	1	1	...	4	4
Dec.	14	6	2	2	7	7	12½	...	3	10	1	8	1	2	...	4	5
Total	193	41	35	39	58	31	46¾	16	8	99	16	88	3	10	7	90	53

Last snow in spring, March 30th.
Last frost in spring, May 23d,
and little in low-lands. June 11th.

First frost in autumn, September 1st.
First snow in autumn, October 31st.

1845.	Clear days.	Cloudy all day.	Part cloudy, part clear.	Rain or snow, or both, all day.	Rain or snow part of the day.	No. of days on which snow fell.	Depth of snow, in inches.	Number of thunder showers.	No. of days all or part foggy.	DIRECTION OF WIND.							
										N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	14	3	3	5	6	5	12¼	...	...	5	4	10	...	...	...	5	7
Feb.....	19	2	2	3	2	4	20¼	...	...	10	1	2	1	...	1	6	7
March..	18	2	4	3	4	4	8	1	3	10	...	7	...	...	...	7	7
April....	9	5	5	5	6	4	3	1	3	9	...	12	...	...	...	5	4
May.....	18	1	2	4	6	2	2½	2	...	6	4	4	...	...	1	11	5
June	17	1	1	3	8	...	...	3	1	8	1	2	...	...	...	18	1
July.....	23	1	1	...	6	...	...	9	...	18	...	1	...	1	1	5	5
August.	22	3	1	...	5	...	...	4	2	6	...	4	3	...	1	16	1
Sept.....	17	2	...	4	7	...	...	6	2	11	...	4	...	...	1	13	1
October	20	3	1	3	4	...	...	...	1	9	2	6	...	1	...	10	3
Nov.....	17	2	...	3	9	1	3	1	1	5	1	2	2	2	3	9	6
Dec.....	17	3	...	2	9	7	12½	...	...	10	1	8	...	...	1	5	6
Total	211	28	20	35	72	27	69¼	27	13	107	14	62	6	4	9	110	53

Last snow in spring, April 11th.
Last frost in spring, May 31st, so severe as to kill corn and vines.

First frost in autumn, September 14th.
First snow in autumn, November 10th.

July 14th, at 2 o'clock, P. M., a severe thunder storm commenced, with high wind and rain; hail-stones fell as large as ounce balls. Just as it began to rain, the Rev. Nathaniel Rawson, of this town, who was raking hay in an open field, was instantly killed by lightning: a small hole was made in his hat, and his rake split in pieces; while a Mr. Lincoln, who was within three or four rods, received little injury. Much damage was done by the lightning and storm.

1846.	Clear days.	Cloudy all day.	Part cloudy, part clear.	Rain or snow, or both, all day.	Rain or snow part of the day.	No. of days on which snow fell.	Depth of snow, in inches.	Number of thunder showers.	No. of days all or part foggy.	DIRECTION OF WIND.							
										N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	18	3	2	3	5	6	15	...	...	7	...	2	1	1	...	7	13
Feb.....	17	4	1	3	3	6	24½	...	...	8	...	8	...	...	...	4	8
March..	18	5	2	3	3	3	2¼	1	...	9	1	3	1	2	1	7	7
April....	17	1	5	7	6	1	1	...	1	6	2	3	1	...	1	13	4
May.....	11	6	3	4	7	...	...	4	...	4	1	7	...	1	3	14	1
June	15	3	3	...	9	...	...	6	1	6	1	7	...	...	...	16	...
July.....	10	5	2	3	11	...	...	5	2	4	2	4	1	...	...	14	6
August.	17	2	5	...	7	...	...	5	4	4	2	4	1	1	...	13	6
Sept.....	21	...	5	...	4	...	...	...	7	5	...	4	1	2	2	12	4
October	18	3	3	3	3	1	1	...	1	7	2	9	...	...	...	12	1
Nov.....	9	9	6	4	2	2	5	...	...	8	...	13	...	...	...	6	3
Dec.....	15	4	2	3	7	7	20½	...	...	14	...	5	...	...	...	6	6
Total	186	45	39	33	67	26	69¼	21	16	82	11	69	6	7	7	124	59

Last snow in spring, April 15th.
Last frost in spring, May 22d.

First frost in autumn, September 16th
First snow in autumn, October 29th, snow fell 16 inches deep.

1847.	Clear days.	Cloudy all day.	Part cloudy, part clear.	Rain or snow, or both, all day.	Rain or snow part of the day.	No. of days on which snow fell.	Depth of snow, in inches.	No. of thunder showers.	No. of days all or part foggy.	DIRECTION OF WIND.							
										N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	18	5	2	1	5	4	10	...	1	10	...	3	...	1	...	11	6
Feb.....	12	3	2	4	7	10	18½	...	...	10	1	8	...	...	...	2	7
March..	12	3	5	3	8	9	12	...	2	15	...	4	...	...	...	6	6
April....	17	1	4	1	7	2	4½	1	...	15	1	2	...	...	...	10	2
May.....	19	3	2	2	5	...	...	...	4	4	2	12	...	...	...	8	5
June....	15	3	...	4	8	...	...	2	1	14	2	3	...	1	3	7	...
July.....	20	...	4	...	7	...	...	7	2	6	1	8	...	1	5	10	...
August.	21	2	1	2	5	...	...	3	1	4	2	5	...	...	...	12	8
Sept.....	12	7	2	1	8	...	...	...	1	8	1	12	...	2	...	6	1
October	24	1	...	2	4	...	...	...	1	12	2	2	4	1	...	5	5
Nov.....	20	2	3	2	3	1	½	...	1	12	...	...	...	4	2	7	5
Dec.....	6	9	4	6	6	8	12	...	3	6	1	8	...	1	1	10	4
Total	196	39	29	28	73	34	57½	13	17	116	13	67	4	11	11	94	49

Last snow in spring, April 23d.
Last frost in spring, April 25th.

First frost in autumn, September 16th.
First snow in autumn, November 28th.

1848.	Clear days.	Cloudy all day.	Part cloudy, part clear.	Rain or snow, or both, all day.	Rain or snow part of the day.	No. of days on which snow fell.	Depth of snow, in inches.	Number of thunder showers.	No. of days all or part foggy.	DIRECTION OF WIND.							
										N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	16	4	5	3	3	2	3½	...	2	14	...	11	1	...	...	5	...
Feb.....	24	1	1	1	1	2	6	...	...	17	2	3	...	1	1	...	5
March..	22	2	1	5	1	2	4½	...	...	10	1	7	...	...	...	8	5
April....	20	2	4	2	2	3	6	...	...	10	...	4	...	1	1	7	6
May.....	13	4	2	3	9	...	...	4	2	10	...	7	...	...	1	10	3
June	18	2	2	...	8	...	...	5	2	15	1	3	...	1	...	9	1
July.....	9	3	10	...	9	...	...	3	3	4	1	6	4	1	...	13	2
August.	17	1	7	1	5	...	...	1	2	7	2	8	1	...	...	12	1
Sept.....	17	2	2	1	8	...	...	1	1	8	1	3	...	1	...	11	6
October	17	6	1	5	2	...	...	1	1	6	2	9	...	1	1	6	6
Nov.....	17	4	3	3	3	4	14¼	...	...	13	...	4	...	...	2	4	8
Dec.....	12	5	2	4	8	4	16	2	...	3	...	10	1	2	...	8	7
Total	202	36	40	28	59	17	50¼	17	13	117	10	75	7	8	6	93	50

Last snow in spring, April 19th.
Last frost in spring, May 1st.

First frost in autumn, September 13th.
First snow in autumn, November 7th.

1849.	Clear days.	Cloudy all day.	Part cloudy, part clear.	Rain or snow, or both, all day.	Rain or snow part of the day.	No. of days on which snow fell.	Depth of snow, in inches.	Number of thunder showers.	No. of days all or part foggy.	DIRECTION OF WIND.							
										N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	20	4	1	...	6	3	3½	...	...	15	1	...	...	1	...	9	5
Feb.....	13	6	...	3	6	9	18¼	...	...	10	...	12	...	...	...	3	3
March..	18	1	3	5	4	2	3¾	...	...	10	1	11	...	1	1	5	2
April....	19	3	2	1	5	1	1	...	...	15	1	2	1	3	...	6	2
May.....	14	8	1	2	6	...	...	2	1	8	2	10	1	2	...	5	3
June	20	...	3	2	5	...	...	2	1	10	...	7	...	...	...	10	3
July.....	22	1	2	1	5	...	...	4	5	4	1	9	1	...	1	7	8
August.	20	1	...	2	8	...	...	1	3	5	...	6	1	1	1	15	1
Sept.....	22	4	1	...	3	...	...	...	...	...	...	...	...	...	...	...	...
October	13	8	2	3	4	1	1	...	...	7	6	6	...	...	1	7	3
Nov.....	17	8	1	2	2	1	1½	1	3	8	2	10	1	1	1	4	4
Dec.....	17	4	2	2	6	8	14½	...	...	18	...	5	...	2	...	4	2
Total	215	48	18	23	69	25	43½	10	13	123	14	88	7	12	5	75	41

Last snow in spring, April 19th.
Last frost in spring, April 20th.

First frost in autumn, October 15th.
First snow in autumn, November 28th.

1850.	Clear days.	Cloudy all day.	Part cloudy, part clear.	Rain or snow, or both, all day.	Rain or snow part of the day.	No. of days on which snow fell.	Depth of snow, in inches.	Number of thunder showers.	No. of days all or part foggy.	DIRECTION OF WIND.							
										N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	17	2	2	4	6	6	17	...	...	13	1	6	1	1	1	5	3
Feb.....	18	2	2	2	4	3	3¼	...	2	13	...	...	...	1	1	8	5
March..	18	1	3	4	5	9	15½	1	...	14	1	6	...	1	...	5	4
April....	17	3	3	4	3	5	7	1	3	10	...	4	1	1	2	9	3
May.....	7	4	3	3	14	...	...	7	3	9	2	9	4	2	...	3	2
June	20	2	...	...	8	...	...	6	3	11	...	4	...	1	3	5	6
July.....	14	4	3	2	8	...	...	4	7	8	2	5	...	1	1	11	3
August.	17	1	2	2	9	...	...	3	6	12	2	3	1	...	2	8	3
Sept.....	19	2	5	2	2	...	...	9	1	15	2	5	2	...	1	5	...
October	19	4	2	2	4	...	...	1	...	18	2	2	...	...	1	6	2
Nov.....	19	6	1	...	4	...	...	5	...	9	4	8	1	1	...	6	1
Dec.*...	8	10	1	3	4	6	7	...	1	14	...	7	...	...	...	5	1
Total	193	41	27	28	69	29	49¾	37	26	146	16	59	10	9	12	76	33

* This month is not complete by five days.

Last snow in spring, April 14th.
Last frost in spring, April 24th.

First frost in autumn, September 30th.
First snow in autumn, December 1st.

This table contains all the days on which the thermometer stood at and below zero at sunrise. Also, the same days at noon above zero for 22 years, beginning in 1829, and ending with 1850:—

Years and Months.	Days of Month.	Sunrise, below 0.	Noon, above 0.
Jan. 1829.	3	12½	½
" "	4	0	14
" "	11	½	10
Feb. "	5	0	31
Jan. 1830.	31	8	9
Feb. "	6	10	9
" "	7	6	17
" "	12	3	14
" "	14	2	24
Jan. 1831.	14	1½	16
" "	21	7	10
" "	24	0	8
Jan. 1832.	26	3	8
" "	27	0	12
" "	28	4	14
March, 1833.	3	4	14
Feb. 1834.	8	0	22
Dec. "	15	10	4
Jan. 1835.	4	10	5
" "	5	7	15
" "	7	6	6
" "	8	5	20
Feb. "	8	0	8
March, 1835.	2	8	25
Dec. "	16	7	7
" "	17	10	2
" "	18	0	13
Jan. 1836.	21	0	29
" "	29	0	13
Feb. "	2	11	4
" "	3	6	11
" "	4	0	12
" "	5	6	3
" "	6	6	13
" "	15	0	14
" "	17	0	23
" "	19	8	29
Dec. "	28	0	14
Jan. 1837.	3	1	4
" "	4	6	12
" "	26	0	18
" "	27	0	24
Feb. "	14	2	18
" "	18	4	16
" 1838.	17	½	9
" "	26	7	5
" "	27	5	8
Jan. 1839.	24	1	6
Feb. "	7	0	18
" "	...	...	...
Jan. 1840.	1	0	8
" "	2	6	7
" "	16	7	4
" "	17	7	6
" "	18	3	10
" "	4	4	5
" "	5	9	15
Jan. 1841.	4	2	16
" "	5	4	22
Feb. "	12	1	16
" "	13	0	16
Jan. 1842.	24	0	18
" 1843.	4	0	14
Feb. "	3	0	30
" "	10	0	28
" "	17	1	22
Jan. 1844.	9	2	16
" "	21	1	14
" "	26	7	5
" "	27	5	8
Jan 1844.	28	6	20
" "	29	0	6
" "	30	4	11
" "	31	1	8
Feb. 1845.	1	0	12
" "	2	2	12
" "	3	2	20
Jan. 1846.	19	2	8
" "	20	½	20
Feb. "	10	0	18
" "	27	6	8
" 1847.	24	0	22
Jan. 1848.	11	9	6
Feb. "	11	1	25
" "	...	...	...
Jan. 1849.	11	6	5
Feb. "	8	5	18
" "	15	1	12
" "	16	0	14
" "	19	1	12
" "	20	2	29
1850, none.			

This table shows one day each for the months of May and September, also two days each for June, July, and August, when the thermometer was below 90°, for 22 years, at sunrise and at noon, beginning with 1829, and ending in 1850:—

Years and Months.	Days of Month.	Sunrise.	Noon.
May, 1829.	25	64	86
June "	5	65	85
" "	15	66	84
July "	21	63	86
" "	22	69	88
August "	8	71	89
" "	22	72	87
Sept. "	2	67	89
May, 1830.	2	57	78
June "	16	69	84
" "	18	63	85
July "	5	69	87
" "	25	72	88
August "	12	65	86
" "	7	64	88
Sept. "	24	64	82
May, 1831.	18	60	80
June "	11	68	89
" "	19	70	88
July "	24	70	86
" "	25	67	84
August "	16	74	88
" "	20	70	86
Sept. "	3	72	80
May, 1832.	14	58	78
June "	12	58	88
" "	25	62	86
July "	3	70	88
" "	6	58	86
August "	7	70	86
" "	10	66	86
Sept. "	19	58	86
May, 1833.	19	62	84
June "	23	60	80
" "	13	48	78
July "	1	62	89
" "	8	70	86
August "	27	68	86
" "	20	54	80
Sept. "	5	68	84
May, 1834.	27	56	80
June "	9	64	88
" "	10	64	84
July "	27	73	88
" "	7	70	86
August "	12	67	86
" "	24	62	84
Sept. "	6	66	80
May, 1835.	20	61	86
June "	10	60	86
" "	3	58	82
July "	24	64	86
" "	14	68	84
Aug. "	14	68	84
" "	18	62	81
Sept. "	6	64	82
May, 1836.	21	59	82
June "	17	60	89
" "	9	64	86
July "	7	68	88
" "	2	62	87
Aug. "	8	58	83
" "	28	56	84
Sept. "	19	64	86
May, 1837.	31	56	83
June "	30	60	83
" "	1	60	82
July "	1	64	89
" "	18	56	82
Aug. "	2	62	86
" "	19	64	84
Sept. "	11	68	78
May, 1838.	21	56	78
June "	14	67	88
" "	12	68	87
July "	4	66	89
" "	9	68	88
Aug. "	8	66	88
" "	4	58	86
Sept. "	7	58	84
May, 1839.	16	54	82
June "	27	54	81
" "	30	60	80
July "	26	68	86
" "	30	66	84
Aug. "	27	69	86
" "	21	62	85
Sept. "	7	62	82
May, 1840.	29	59	86
June "	10	53	82
" "	24	57	80
July "	12	62	89
" "	17	69	88
Aug. "	21	64	86
" "	23	70	84
Sept. "	10	64	80
May, 1841.	22	56	80
June "	30	72	88
" "	8	67	87
July "	23	70	89
" "	20	62	86
Aug. "	4	62	88
" "	21	66	87
Sept. "	3	68	84
May, 1842.	11	50	76
June "	26	62	80
" "	17	66	79
July "	30	68	86
" "	13	64	84
Aug. "	23	56	86
" "	15	64	84
Sept. "	13	70	80
May, 1843.	15	56	80
June "	24	64	84
" "	22	62	82
July "	29	74	88
" "	24	64	86
Aug. "	13	62	85
" "	27	66	83
Sept. "	19	68	86
May, 1844.	25	64	82
June "	27	68	86
" "	28	70	84
July "	21	64	85
" "	24	66	84
Aug. "	17	62	86
" "	18	64	84
Sept. "	10	72	78
May, 1845.	12	64	88
June "	10	64	88
" "	13	62	84
July "	15	68	88
" "	26	52	85
Aug. "	23	72	88
" "	21	70	87
Sept. "	3	66	81
May, 1846.	25	54	83
June "	15	62	85
" "	4	60	84
July "	12	74	88
" "	21	66	86
Aug. "	17	66	88
" "	29	66	86
Sept. "	6	74	87
May, 1847.	10	58	80
June "	25	62	86
" "	27	68	84
July "	8	64	88
" "	13	70	86
Aug. "	10	70	86
" "	12	70	84
Sept. "	6	68	84
May, 1848.	20	62	86
June "	16	66	88
" "	29	70	86
July "	26	68	88
" "	22	68	86
Aug. "	17	72	89
" "	15	68	86
Sept. "	1	65	82
May, 1849.	21	58	78
June "	16	60	89
" "	20	70	88
July "	20	64	89
" "	8	68	88
Aug. "	29	70	86
" "	31	68	84
Sept. "	17	60	82
May, 1850.	28	55	78
June "	29	68	88
" "	19	65	87
July "	16	72	88
" "	1	67	87
Aug. "	6	68	88
" "	5	70	86
Sept. "	1	68	84

Average of the thermometer for each quarter of the year, viz. winter, spring, summer, and fall. Also, the average for each year, for 22 years, beginning the 1st day of December, 1828, and ending the 30th of November, 1850.

YEARS.	WINTER: Dec. Jan. Feb.		SPRING: March, April, May.		SUMMER: June, July, Aug.		FALL: Sept. Oct. Nov.		WHOLE YEAR.	
	Sunrise.	Noon.	Sunrise.	Noon.	Sunrise.	Noon.	Sunrise.	Noon.	Sunrise.	Noon.
	°	°	°	°	°	°	°	°	°	°
1828–29	23.17	33.05	38.50	54.22	60.12	76.95	42.69	56.62	41.22	65.48
1829–30	24.42	34.75	48.04	56.54	62.67	77.79	48.02	60.67	44.21	57.96
1830–31	22.70	31.12	43.04	56.77	63.78	79.91	46.97	58.39	44.25	56.41
1831–32	19.93	29.69	36.80	51.14	58.93	76.58	44.97	58.22	40.21	53.96
1832–33	24.93	32.65	39.91	56.61	58.93	74.68	43.52	56.13	41.67	55.14
1833–34	25.47	34.03	38.27	53.80	60.14	77.01	42.86	56.24	41.77	55.38
1834–35	21.66	30.99	35.69	50.89	58.40	76.40	43.21	58.38	39.83	54.28
1835–36	17.05	26.83	35.01	60.67	57.14	73.01	40.55	53.87	37.55	51.27
1836–37	19.21	29.11	35.17	49.79	56.88	72.94	41.54	55.59	38.74	51.58
1837–38	21.17	31.83	36.12	51.38	61.76	80.26	41.37	53.99	40.21	54.48
1838–39	21.31	31.85	38.80	54.49	58.46	74.25	42.41	57.27	40.34	54.58
1839–40	22.57	31.26	39.27	54.48	60.54	76.80	43.33	56.19	41.27	54.77
1840–41	23.07	34.33	36.46	51.39	60.30	77.45	42.44	55.35	40.66	50.74
1841–42	26.05	36.05	38.88	53.27	60.52	75.74	41.62	56.97	41.86	55.61
1842–43	22.77	32.71	35.54	50.43	59.82	76.17	43.16	56.22	40.41	54
1843–44	19.09	32.16	41.33	56.80	59.65	75.43	42.96	56.91	40.87	55.59
1844–45	24.71	34.81	38.91	64.25	60.65	78.58	43.46	57.01	42.03	53.51
1845–46	19.63	29.43	39.73	56.94	60.24	76.96	46.04	58.15	41.40	55.87
1846–47	21.97	31.88	36.44	51.16	60.33	77.06	43.66	56.84	40.54	54.43
1847–48	25.38	35.71	38.37	54.02	60	77	40.50	55.04	41.12	55.33
1848–49	21.11	30.90	36.73	51.09	59.68	78.42	44.70	58.21	40.65	54.76
1849–50	24.55	33.55	35.43	48.80	59.52	77.81	43.56	57.93	41.25	54.93

REMARKS.—You will see that 1830 was the warmest, and 1836 was the coldest year in the above table; and that July, 1838, was the warmest, and February, 1838, the coldest month in said years; and that the 24th of August, 1838, was the warmest day at noon, mercury 96°; and that the 16th day of December was the coldest, mercury 7° below zero at sunrise and at noon, and at 9 P.M. 13° below. The 3d of January, 1829, it was $12\frac{1}{2}$°, below zero, and at noon $\frac{1}{2}$° below.

This table contains all the days on which the thermometer stood at and above 90°, at sunrise and at noon of same day, for 22 years, beginning with the year 1829, and ending with 1850.

Years and Months.	Days of Month.	Deg. at Sunrise.	Deg. at Noon.
July, 1829	15	65	90
" 1830	16	67	90
" "	17	72	92
" "	18	72	94
" "	19	72	93
" "	20	70	90
" "	21	70	94
" "	22	72	95
May, 1831	30	71	90
" "	31	66	92
June, "	1	71	91
" "	2	72	92
" "	3	62	92
Aug. "	18	70	91
" "	19	66	92
" "	21	72	92
June, 1832	16	68	90
" "	17	70	90
July, "	2	68	92
" "	7	62	92
" 1833	14	68	90
" "	22	64	90
" 1834	8	72	92
" "	9	72	95
Aug. "	5	61	90
" "	6	70	90
" "	7	66	94
July, 1835	13	68	90
" 1836	8	68	92
1837.			
June, 1838	10	60	91
" "	11	68	91
July, "	8	60	90
" "	10	70	93
" "	11	74	90
" "	30	72	91
Aug. 1838	6	70	90
" "	24	68	96
1839.			
July, 1840	15	68	92
" "	16	66	92
Aug. "	20	64	90
1841.			
1842.			
July, 1843	1	70	90
1844.			
June, 1845	9	72	90
July, "	14	64	95½
" "	16	70	92
" "	17	70	92
" "	21	70	90
Aug. "	9	70	90
July, 1846	10	70	92
" "	11	76	94
" "	30	68	90
Aug. "	6	70	92
July, 1847	7	62	90
" "	11	70	92
" "	18	70	90
" "	19	68	91
" "	20	70	91
June, 1848	17	70	90
" "	18	62	90
June, 1849	21	73	92
" "	22	65	93
" "	23	68	92
" "	24	62	90
July, "	12	68	90
" "	13	71	92
June, 1850	20	70	90
July, "	30	72	90

The mercury did not rise as high as 90° during the years that are left blank.

This table shows one day each of the coldest weather in the months of March and November, also two days each in the months of December, January, and February, when the mercury was above zero, for 22 years, from January, 1829, to December, 1850:—

Years and Months.	Days of Month.	Sunrise.	Noon.	Years and Months.	Days of Month.	Sunrise.	Noon.	Years and Months.	Days of Month.	Sunrise.	Noon.	Years and Months.	Days of Month.	Sunrise.	Noon.
Jan. 1829.	12	4	22	Jan. 1835.	3	2	8	Jan. 1841.	3	12	18	Jan. 1847.	22	2	5
" "	10	2	8	" "	9	1	22	" "	19	6	20	" "	28	5	18
Feb. "	23	3½	14	Feb. "	9	2	18	Feb. "	24	6	23	Feb. "	5	8	22
" "	24	4	28	" "	11	1	26	" "	25	6	29	" "	13	10	28
March "	15	14	27	March "	5	1	31	March "	5	9	34	March "	12	12	28
Nov. "	13	20	36	Nov. "	30	11	25	Nov. "	30	16	32	Nov. "	16	13	27
Dec. "	4	10	28	Dec. "	3	1	20	Dec. "	22	6	22	Dec. "	21	15	25
" "	23	13	30	" "	11	5	21	" "	26	10	24	" "	27	5	14
Jan. 1830.	19	3	24	Jan. 1836.	16	3	14	Jan. 1842.	3	6	14	Jan. 1848.	10	3	6
" "	24	4	17	" "	28	1	14	" "	6	1	22	" "	19	7	14
Feb. "	9	2	26	Feb. "	7	4	29	Feb. "	9	6	15	Feb. "	12	1	25
" "	13	8	18	" "	18	1	15	" "	15	6	20	" "	26	4	25
March "	9	14	28	March "	6	6	32	March "	12	12	26	March "	15	4	14
Nov. "	27	36	40	Nov. "	26	11	25	Nov. "	29	16	24	Nov. "	11	10	28
Dec. "	22	6	13	Dec. "	30	4	8	Dec. "	19	10	24	Dec. "	23	8	15
" "	23	5	19	" "	31	2	12	" "	24	2	22	" "	24	7	28
Jan. 1831.	13	1	10	Jan. 1837.	14	4	13	Jan. 1843.	1	10	23	Jan. 1849.	10	4	8
" "	25	2	14	" "	15	1	15	" "	2	10	21	" "	19	2	11
Feb. "	6	2	16	Feb. "	3	6	22	Feb. "	9	4	22	Feb. "	7	3	28
" "	8	4	28	" "	19	8	29	" "	18	2	26	" "	10	2	14
March "	6	2	16	March "	2	2	21	March "	3	8	24	March "	5	14	32
Nov. "	30	20	26	Nov. "	26	6	24	Nov. "	15	18	38	Nov. "	1	24	28
Dec. "	16	1	19	Dec. "	22	5	16	Dec. "	6	10	30	Dec. "	12	12	22
" "	23	2	15	" "	23	4	23	" "	13	4	18	" "	26	2	12
Jan. 1832.	4	4	16	Jan. 1838.	30	7	12	Jan. 1844.	11	2	18	Jan. 1850.	1	4	12
" "	23	5	32	" "	31	2	14	" "	20	2	12	" "	7	8	32
Feb. "	17	4	18	Feb. "	21	2	16	Feb. "	1	4	18	Feb. "	4	5	18
" "	24	1	13	" "	27	2	21	" "	10	4	20	" "	5	5	14
March "	18	9	12	March "	2	13	34	March "	5	8	24	March "	4	9	20
Nov. "	16	14	40	Nov. "	25	3	16	Nov. "	26	14	20	Nov. "	23	28	46
Dec. "	23	10	16	Dec. "	17	3	22	Dec. "	21	6	24	Dec. "	14	2	22
" "	30	11	28	" "	24	4	10	" "	29	8	26	" "	24	5	10
Jan. 1833.	17	8	13	Jan. 1839.	20	3	10	Jan. 1845.	14	10	28				
" "	19	1	13	" "	22	2	16	" "	19	3	17				
Feb. "	7	3	12	Feb. "	6	4	12	Feb. "	10	7	26				
" "	25	2	16	" "	10	4	24	" "	13	6	12				
March "	25	2	16	March "	4	2	22	March "	12	18	48				
Nov. "	21	14	40	Nov. "	26	13	18	Nov. "	29	10	24				
Dec. "	13	10	24	Dec. "	19	7	17	Dec. "	12	2	13				
" "	20	13	28	" "	20	2	14	" "	13	2	20				
Jan. 1834.	23	3	10	Jan. 1840.	3	3	14	Jan. 1846.	18	3	6				
" "	24	2	15	" "	26	4	15	" "	22	5	6				
Feb. "	12	13	18	Feb. "	2	6	22	Feb. "	13	4	6				
" "	13	12	30	" "	3	9	26	" "	19	2	20				
March "	22	14	24	March "	8	7	26	March "	1	9	27				
Nov. "	17	21	38	Nov. "	21	23	36	Nov. "	27	23	28				
Dec. "	17	11	22	Dec. "	25	2	14	Dec. "	16	8	22				
" "	26	9	18	" "	26	10	20	" "	24	9	26				

This table shows when July was the warmest and when August was the warmest, for 22 years: also, when January was the coldest, and when February was the coldest, for the same period:—

Years.	January.	February.	July.	August.
1829		Coldest.		Warmest.
1830	Coldest.		Warmest.	
1831		Coldest.		Warmest.
1832		Coldest.		Warmest.
1833		Coldest.	Warmest.	
1834	Coldest.		Warmest.	
1835		Coldest.	Warmest.	
1836		Coldest.	Warmest.	
1837	Coldest.		Warmest.	
1838		Coldest.	Warmest.	
1839	Coldest.		Warmest.	
1840	Coldest.		Warmest.	
1841		Coldest.		Warmest.
1842	Coldest.		Warmest.	
1843		Coldest.		Warmest.
1844	Coldest.			Warmest.
1845		Coldest.		Warmest.
1846		Coldest.	Warmest.	
1847	Coldest.		Warmest.	
1848		Coldest.		Warmest.
1849		Coldest.	Warmest.	
1850	Coldest.		Warmest.	

Temperature of water in 4 wells and 5 springs, taken in August, at and near my residence:—

Wells: 1 at	53¾°	Springs: 2 at	54°
1 at	53	1 at	53
1 at	52	1 at	52
1 at	51	1 at	51

As cold-water establishments have of late become quite popular in curing diseases, I have made this note.

The author of the foregoing tables, Mr. Jonathan Clark, is one of the most careful and laborious observers and recorders of meteorological facts, of my acquaintance, in our State. I hope they will be carefully transferred to the pages of the Patent Office Report.

C. F. CLEAVELAND, M. C.

Burlington, January 8, 1851.

Sir:—About the first of this month, your circular of August 26, 1850, was put into my hands, with a request that I would furnish you with something in relation to our meteorology. I have kept a meteorological journal here, most of the time, for the last 20 years, and for the last 13 years it has been uninterrupted. The enclosed paper contains some abstracts from it. In addition to this, my journal contains daily records of the clearness of the sky, course of the winds, range of barometer, closing and opening of the lake, &c. &c. Those could be furnished, if desired, if I could find time to copy them; but perhaps I now send you more than you will think best to use.

Respectfully, your ob't servant,

ZADOCK THOMPSON

THOMAS EWBANK, Esq.
Commissioner of Patents, Washington, D. C

Abstracts of Meteorological Observations made at Burlington, Vermont, by Zadock Thompson.

Burlington is on the east side of Lake Champlain, where the lake is 10 miles wide. The place of observation is one mile from the lake shore, and 256 feet above the mean level of the lake, and in lat. 44° 29′ N. and 73° 11′ W. from Greenwich. The mean level of Lake Champlain is 90 feet above that of the ocean.

The mean temperatures are deduced from *three daily observations*, made at sunrise, 1 P. M. and 9 P. M.

Monthly and Annual Temperature of 13 *Years.*

Months.	1838.	1839.	1840.	1841.	1842.	1843.	1844.	1845.	1846.	1847.	1848.	1849.	1850.	Mean of 13 Years.
	°	°	°	°	°	°	°	°	°	°	°	°	°	°
January...	25.7	18.6	12.2	25.3	22.3	28.02	9.91	21.36	19.77	20.97	24.17	15.06	23.74	20.55
February..	12.3	24.2	28.4	19.6	26.6	12.95	20.33	22.63	15.05	18.59	21.09	14.34	24.32	20.04
March	32.6	31.6	31.4	25.3	35.8	25.66	31.00	34.09	33.89	25.73	29.03	31.66	30.47	30.63
April	35.8	46.3	47.0	39.1	44.6	43.85	49.50	43.82	47.73	37.48	42.89	39.90	41.35	43.02
May.....	51.7	53.3	57.2	52.8	53.5	53.92	58.50	53.81	57.60	56.40	58.86	51.59	51.64	54.68
June.....	68.1	60.7	65.6	67.1	63.8	61.86	66.50	65.21	64.97	64.15	65.02	66.76	67.12	65.15
July.....	71.8	71.5	71.6	68.9	70.0	64.16	67.10	68.40	69.51	71.03	68.39	72.74	70.03	69.63
August	67.5	68.3	72.5	70.5	70.1	67.78	65.60	69.43	70.45	67.62	66.82	69.14	66.03	68.60
September	60.5	60.6	58.3	61.9	57.3	59.59	59.90	58.12	64.75	58.80	56.41	58.02	59.69	59.53
October ...	46.8	50.8	48.0	45.0	47.5	42.84	47.00	51.15	45.37	45.89	47.24	47.10	48.25	47.15
November.	31.3	34.0	35.6	35.3	34.4	31.56	34.10	39.26	41.26	39.84	34.81	43.29	40.38	36.55
December.	19.1	26.2	21.1	26.4	21.3	26.87	23.40	17.81	23.43	27.00	30.01	23.17	18.65	23.42
An. Temp.	43.7	45.6	45.7	44.8	45.6	43.25	44.40	45.42	46.15	43.88	45.39	44.40	45.14	44.91

Monthly and Annual Fall of Water, for 13 Years, in inches and hundredths.

Months.	1838.	1839.	1840.	1841.	1842.	1843.	1844.	1845.	1846.	1847.	1848.	1849.	1850.	Mean of 13 Years.
January ...	2.58	0.85	1.26	3.49	1.04	0.71	2.29	2.38	1.72	2.80	1.84	0.79	1.57	1.74
February .	1.32	1.20	1.89	0.80	3.75	1.43	0.73	2.52	1.47	1.85	0.90	0.41	1.79	1.54
March	1.10	1.43	3.05	3.23	1.97	2.12	2.35	2.48	2.20	2.10	2.44	2.14	1.11	2.13
April	1.34	1.60	4.69	3.51	2.52	0.82	1.43	2.22	0.91	3.15	1.09	0.47	2.41	2.01
May	4.51	2.48	2.46	2.28	1.55	2.47	4.40	3.39	3.18	1.85	4.24	2.74	5.04	3.12
June	5.37	3.70	2.84	5.16	3.24	4.58	2.08	2.08	3.63	5.05	2.19	1.41	3.18	3.42
July	3.25	6.26	4.18	2.87	4.62	2.59	5.35	4.51	5.08	4.05	3.57	1.73	5.08	4.08
August	2.41	1.91	3.51	1.40	1.74	2.09	3.46	2.37	0.48	3.12	4.40	5.69	0.89	2.57
September	1.33	2.91	4.71	3.62	3.80	1.80	1.36	5.62	3.78	4.69	2.91	1.33	3.25	3.16
October ...	2.98	0.45	3.76	0.83	4.10	5.03	5.11	2.26	2.65	3.69	2.59	5.32	8.11	3.61
November.	3.78	2.57	2.22	2.47	2.32	1.63	0.57	4.00	2.88	2.13	2.26	2.09	1.77	2.41
December.	0.92	2.68	2.62	3.02	3.20	1.48	2.08	2.21	1.68	4.07	2.95	1.63	3.31	2.45
An. Am't..	30.89	27.99	37.19	32.68	33.85	26.75	31.21	36.01	29.66	38.55	31.38	26.35	37.51	32.24

The fall of water embraces that obtained from melted snow, as well as rain.

Fall of Snow in 13 successive Winters, in Inches.

Months.	1837–'38.	1838–'39.	1839–'40.	1840–'41.	1841–'42.	1842–'43.	1843–'44.	1844–'45.	1845–'46.	1846–'47.	1847–'48.	1848–'49.	1849–'50.
October.....	0	1	0	2½	0	0	10	0	0	7	0	0	0
November..	7	7½	3½	10½	8½	9	3	2	0	5	4	3	1
December..	8	12½	22	17	17½	47	18	13	36	22	13	18	19
January....	15	3½	11½	25½	7	9	16	20	9	24	11	10	16
February...	17	7	1	14	20	20	13	22	24	25	19	10	18
March	12	6	10	16	11	38	18	12	4	22	20	7	12
April.....	1	3½	0	7	0	2	0	6	0	7	1	0	8
Total. ...	60	41	48	92½	64	123	78	75	73	112	68	48	74

The snows were measured immediately after their fall.

Advance of Spring for 14 Successive Years.

Years.	Robins seen.	Bluebirds seen.	Barn Swallows seen.	Currants blossom.	Red Plums blossom.	Plums & Cherries blossom.	Crab Apples blossom.	Com. Apples blossom.
1837..	March 20	March 23	April 30	May 16	May 19	May 28	May 30	June 2
1838..	" 23	" 27	May 2	" 19	" 22	" 26	June 1	" 2
1839..	" 25	" 31	April 26	" 4	" 12	" 14	May 22	May 26
1840..	" 15	" 15	" 21	" 3	" 12	" 17	" 20	" 23
1841..	" 27	" 27	" 27	" 23	" 25	" 26	" 29	" 31
1842..	" 13	" 13	May 2	" 11	" 14		" 27	" 29
1843..	April 12	April 12	" 3		" 15	" 17		" 26
1844..	March 21	March 25	April 25	April 25	April 30	" 4	" 9	" 11
1845..	" 9	" 13	May 3			" 13		" 21
1846..	" 25	" 26	April 29	" 29	May 5	" 10	" 13	" 17
1847..	" 25	" 25	May 4	May 16	" 20	" 22	" 26	" 28
1848..	" 25	" 28	" 4	" 5	" 11	" 14	" 18	" 20
1849..	" 14	" 26	" 10	" 20	" 23	" 26	June 1	June 4
1850..	" 29	" 28	" 2	" 13	" 19	" 20	" 2	" 4

Meteorological Table for 1850.—*Climate of Newark.*

Barometer, one of Troughton's, well-regulated: Thermometer, self-registering, hanging about nine feet from the ground, with a northern exposure, protected from rain and reflection. The monthly means are deduced from those of each day. The surface of the rain-gauge, four feet from the ground. The number of fair days, derived from the addition of half-days, the general character of each A. M. and P. M. being recorded Days of rain, those on which it fell in appreciable quantities. Days of snow, those on which it fell, without regard to quantity.

MONTHS.	BAROMETER.				THERMOMETER.							DAILY RANGE.			WEATHER.				
	Mean, 7½ A. M.		Mean, 5 P. M.		Maximum.		Minimum.		Highest daily mean.	Lowest daily mean.	Monthly mean.	Greatest.	Least.	Mean.	Fair on Days.	Rain on Days.	Snow on Days.	Inches of Rain and Snow.	Prevailing Winds.
	Attached Pressure Thermometer.		Attached Pressure Thermometer.		Date.	Degree.	Date.	Degree.											
January	Imper	fect.	observ	ations.	27	57.75	1	13.00	49.50	19.00	34.444	23.00	1.00	11.39	14	10	6	5.010	N. W.
February	39.75	29.97	44.52	30.11	27	63.00	5	10.00	50.50	17.37	35.232	30.75	2.75	13.62	20	5	3	3.055	S. W. to N. W.
March	44.93	29.97	50.52	29.96	14	71.00	4	9.75	63.75	19.88	38.193	28.50	2.25	14.02	20	6	8	4.175	N. W.
April	63.61	30.01	65.16	30.00	30	74.00	15	24.25	62.50	34.62	47.745	32.00	8.00	20.73	18	10	2	3.030	N. W. to S. W.
May	67.64	29.99	69.00	29.97	28	86.75	3	37.75	73.75	49.38	57.020	32.50	3.00	18.69	15	16	—	7.435	Variable.
June	73.95	30.08	75.04	30.04	20	93.00	2	46.25	82.63	55.50	71.092	29.25	9.50	21.10	20	7	—	3.535	S. W.
July	76.88	30.07	78.35	30.05	25	93.50	12	55.50	83.87	67.00	75.399	28.75	3.00	17.86	21	9	—	7.420	S. E. to E.
August	73.95	30.03	76.20	30.03	6	92.00	18	53.00	80.88	64.50	72.383	25.25	1.75	17.82	24	9	—	4.725	N. W. to S. W.
September	69.90	30.10	60.67	30.08	6	85.75	30	42.00	78.75	53.37	65.725	28.50	1.00	17.40	22	5	—	4.405	N. W.
October	66.48	30.04	66.88	30.42	5	74.75	30	32.00	65.25	47.25	56.214	33.25	6.75	18.70	23	6	—	1.725	N. W. to S. W.
November	63.90	30.01	66.14	30.04	27	67.50	23	25.75	57.50	32.75	47.016	33.25	2.75	15.72	16	6	—	1.520	N. W. to S. W.
December	60.98	30.07	62.48	30.06	1	56.75	25	11.00	45.62	20.00	33.793	24.75	2.00	12.01	12	8	9	5.110	N. W. to S. W.
Mean results, 1850.	63.81	30.03	64.98	30.07	Max.	93.50	Min.	9.75	66.21	40.05	52.855	29.15	3.65	16.59	224	97	28	51.145	
Do. 1849.	56.48	29.91	62.12	29.88	"	99.75	"	2.75	63.42	36.71	50.889	29.11	3.00	15.35	214	95	22	40.050	
Do. 1848.	57.71	30.07	62.36	30.05	"	94.50	"	0.00	64.37	36.62	51.249	30.08	5.42	17.41	233	91	23	36.905	
Do. 1847.	58.38	30.08	62.67	30.06	"	93.50	"	0.50	65.30	36.30	49.831	29.85	4.00	16.73	219	91	31	54.835	
Do. 1846.	60.49	30.08	64.57	30.04	"	94.00	"	1.50	65.43	37.65	51.661	28.17	2.54	15.30	209	98	23	51.575	
Do. 1845.	64.36*	30.09*	67.69*	30.01*	"	98.25	"	3.50	64.28	36.00	51.370	28.67	4.54	15.87	238	88	24	36.470	
Do. 1844.	* The last three months.				"	92.50	"	3.75	62.96	38.54	51.208	28.23	3.35	16.31	232	101	23	40.205	

Monthly Means of the Thermometer, taken at Sunrise and at Noon, for 22 Years, beginning January 1st, 1829, and ending December, 1850.

Years.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.	
	Sunrise.	Noon.	Sunrise.	Noon.	Sunrise.	Noon.	Sunrise.	Noon.	Sunrise.	Noon.	Sunrise.	Noon.	Sunrise.	Noon.	Sunrise.	Noon.	Sunrise.	Noon.	Sunrise.	Noon.	Sunrise.	Noon.	Sunrise.	Noon.
	▪	○	○	○	○	○	○	○	○	○	○	○	○	▪	○	○	▫	○	○	○	○	○	○	○
1829.....	22.80	31.22	14.18	27.18	25.38	38.50	38.66	54.73	51.47	71.25	57.50	74.83	60.50	77.50	62.29	78.13	49.76	66.53	42.51	58.90	35.80	44.36	33.71	42.90
1830.....	20.09	29.99	19.46	32.35	31.09	44.00	42.26	59.13	49.80	66.68	59.26	73.90	65.32	81.16	63.32	78.51	54.03	68.80	45.96	62.51	44.16	50.63	31.77	37.85
1831.....	17.74	25.77	18.07	29.63	34.16	45.38	42.76	56.56	52.19	68.35	64.23	80.13	64.38	78.84	65.93	80.77	56.63	69.96	47.93	61.77	34.00	44.33	13.87	22.71
1832.....	22.93	33.42	23.24	33.16	29.38	42.38	34.93	48.93	46.03	62.03	55.50	74.36	58.90	77.42	62.29	77.90	53.23	68.13	45.29	59.67	36.40	46.80	27.13	34.09
1833.....	26.58	33.19	20.64	30.46	26.22	40.42	41.73	60.00	51.80	69.51	54.30	71.54	61.33	77.54	58.06	69.84	54.16	69.20	45.13	57.45	31.22	41.67	27.80	33.20
1834.....	20.87	28.64	28.64	40.25	30.03	42.74	38.96	56.06	45.84	62.67	54.63	71.60	65.16	81.77	60.45	77.48	60.46	69.60	41.26	55.16	31.55	44.00	23.93	32.80
1835.....	22.09	31.61	18.32	28.28	24.90	37.77	34.23	49.13	46.93	65.71	56.26	73.93	60.35	79.29	58.51	75.90	48.38	66.73	46.71	63.74	34.46	44.50	18.19	25.64
1836.....	20.29	29.32	12.38	25.44	22.30	35.82	35.56	50.40	47.16	65.77	53.30	69.20	62.96	77.63	56.13	73.42	54.36	68.16	36.67	52.93	30.43	40.53	23.48	32.55
1837.....	14.55	24.90	19.64	29.96	25.16	37.65	35.00	51.23	45.38	60.64	55.56	72.06	57.51	74.19	57.51	72.59	50.10	66.50	41.84	55.51	32.66	44.46	23.06	33.51
1838.....	27.38	37.06	12.21	24.18	30.13	43.38	32.66	48.06	45.45	62.58	57.56	78.26	67.90	82.29	60.96	80.16	53.70	68.66	40.09	53.55	30.70	39.70	19.97	30.51
1839.....	21.48	30.93	22.64	34.35	28.77	40.77	39.33	56.90	48.31	65.87	52.63	69.00	62.38	78.45	60.06	75.13	52.00	67.70	44.00	60.32	31.20	41.70	26.45	33.51
1840.....	13.90	25.80	27.69	38.13	30.32	41.64	40.23	54.66	47.29	67.13	57.03	72.60	62.29	79.90	62.19	78.09	50.90	67.36	44.48	57.22	34.23	43.96	21.71	32.42
1841.....	26.35	35.71	20.96	34.89	28.55	44.00	34.80	48.36	45.03	61.77	58.80	75.53	60.61	77.80	61.45	78.93	57.33	72.10	38.13	51.45	31.96	42.63	27.32	36.00
1842.....	22.93	34.13	28.10	38.25	34.16	46.03	38.46	53.06	44.00	60.71	52.20	71.23	63.80	79.13	62.06	76.71	52.00	67.40	42.00	59.29	30.86	44.16	24.51	31.38
1843.....	27.06	38.06	15.03	28.25	19.93	34.67	39.26	52.33	47.55	64.35	56.20	73.40	60.65	77.39	62.51	77.64	56.56	72.33	41.90	53.81	31.06	54.00	24.19	35.42
1844.....	13.22	24.74	20.00	36.62	30.74	41.84	42.50	62.90	50.80	66.48	57.96	73.63	60.32	75.51	60.00	77.10	49.11	69.23	43.77	55.54	32.63	46.00	26.13	34.90
1845.....	25.35	34.66	22.43	34.89	31.64	45.42	37.30	53.13	48.06	64.16	56.43	72.56	62.71	79.81	62.67	80.93	51.66	66.60	40.74	56.29	37.86	48.17	20.51	28.19
1846.....	22.58	32.74	15.71	27.14	30.35	44.39	38.36	58.03	49.16	66.61	55.29	75.23	63.29	79.19	61.32	79.29	57.10	75.06	41.10	55.14	40.16	47.06	22.64	31.84
1847.....	21.35	31.16	21.25	32.00	24.67	36.38	34.81	50.60	48.61	64.51	57.90	74.30	62.26	82.64	60.77	77.40	52.80	65.93	40.03	55.38	38.26	49.26	31.96	37.64
1848.....	25.22	34.51	18.62	32.86	25.22	38.71	37.07	54.00	52.77	67.38	58.53	74.50	60.55	78.13	60.87	78.29	49.96	67.88	42.03	56.06	29.46	40.86	30.67	39.51
1849.....	17.41	36.19	14.60	26.21	30.06	40.00	35.90	51.63	44.20	60.68	56.60	76.86	61.09	80.09	61.26	78.23	50.43	61.43	43.22	55.39	40.50	51.93	24.71	31.97
1850.....	23.26	33.06	25.82	35.82	26.45	34.64	34.20	48.73	45.33	59.80	57.80	77.26	62.61	79.90	58.74	76.22	53.46	67.93	44.00	58.22	36.56	47.63	23.92	32.19

Meteorological Table for the Year 1850. *Union County, Arkansas.*

Latitude, 33 degrees 18 minutes north; longitude, west of Washington, 16 degrees.

	Morning.	Noon.	Night.	Clear Days.	Cloudy Days.	Rainy Days.	Thunder.	Lightning.	Frost.	Snow.	Sleet.	Hail.	The Highest Range of the Thermometer in each Month.	The Lowest Range in each Month.	Highest Range in the Year.	Lowest Range in the Year.	Difference between the Highest and Lowest Range.	Quantity of Rain in each Month.
January	43	50	49	10	21	16	6	4	3	...	1	...	70°	29°	...	...	...	9.13
February	43	53	46	10	18	10	2	...	5	2	...	...	79	18	...	...	...	6.53
March	50	61	56	12	19	11	9	5	9	1	1	2	79	32	...	...	...	5.25
April	56	67	63	11	19	14	13	4	3	...	1	1	81	36	...	...	...	11.88
May	62	71	67	16	15	14	11	3	...	...	...	...	88	47	...	...	...	7.24
June	71	82	77	22	8	17	15	10	...	...	...	...	89	58	...	...	...	3.26
July	73	87	80	24	7	13	22	15	...	...	...	...	93	65	...	...	...	2.63
August	76	91	82	29	2	12	16	11	...	...	...	...	98	69	98	...	...	13.33
September	67	82	74	29	1	3	4	2	...	...	...	...	87	58	...	...	...	1.25
October	56	70	64	25	6	9	6	2	2	...	...	...	82	37	...	...	...	2.50
November	46	60	56	17	13	12	3	3	8	...	...	...	76	25	...	...	...	6.25
December	39	46	44	12	18	14	3	2	3	3	2	...	75	13	...	13	85	11.12
Mean for the year.	52	65	63	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	.....	217	147	145	130	61	32	6	5	3	.....	.....	.....	.....	.....	81.87/100

The mean range of the Thermometer is represented in the three first columns.

The rain-gauge is graduated to the hundredth part of an inch. All days in which rain fell are marked rainy days. Days, the greater part of which were cloudy, are registered cloudy days. When thunder and lightning occurred, they are marked one to the day under their appropriate column.

D. C. ROSS.

Report of the Temperature for 15 *Years, from* 1836 *to* 1850.

Hillsborough, Highland County, Ohio.

Latitude about 39° 15′ North; longitude about 6° 45′ West from Washington. Elevation nearly 700 feet above low water at Cincinnati.

The thermometer hangs outside of the house, on the north side. It has been examined at sunrise in the morning, and about 2 o'clock, P. M., each day. The highest and lowest points during each month, are put down in the 1st and 2d column for each year, and, in the 3d column, the average of the month. The highest and lowest points during each month, are put down in the 1st and 2d column for each year, and, in the 3d column, the average of the month. The average for the whole year is given at the bottom, except three years, during which I was from home part of the time. The lowest point to which the mercury has sunk, in the 15 years, is 22 below zero: the highest to which it has risen, 92 above. The coldest year was 1836; the warmest, 1846. The coldest winter was that of 1840 and 1841; the warmest, 1844 and 1845.

JOS. McD. MATHEWS.

	1836.			1837.			1838.			1839.			1840.			1841.			1842.			1843.			1844.			1845.			1846.			1847.			1848.			1849.			1850.		
	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.
January	14	54	27	4	44	25	4	60	31.8	6	58	34	2	50	23.5	8	49	27.9	9	59	35	4	64	35.3	15	54	28.5	18	57	36.8	7	56	34	4	62	27.9	4	55	36.1	5	55	28.4	4	54	34
February	11	51	24	3	54	37	22	12	15	6	60	33.6	4	68	49.1	1	50	28.9	4	63	34.9	5	49	24.4	10	61	34.6	8	65	37.3	1	53	30.3	5	53	34.4	13	55	34.8	2	62	27.7	2	62	33.5
March	8	52	32	15	64	38	6	77	43	10	73	36	16	71	44.1	13	76	36.3	23	76	50.5	1	50	26.2	17	65	41.2	13	73	44.3	17	62	42.2	11	66	37.1	2	79	39.7	25	64	43.9	14	62	38
April	22	86	49.5	23	80	42.5	24	76	49	28	80	56	24	82	62.6	23	75	48.2	30	80	56	24	78	49.4	27	82	61.8	18	83	58.4	31	82	56.7	24	77	53.2	32	78	51.9	22	81	49.2	24	74	46.4
May	35	82	62	32	85	58	30	80	51	30	83	63.5	36	83	60.2	34	84	58.5	38	77	59.2	40	76	60	37	82	63.4	36	81	60.5	43	86	65.5	38	80	59.3	42	80	64.6	42	79	60	36	82	56
June	50	82	66	44	82	61	46	86	63.5	46	89	61	44	85	67.6	52	99	72.8	46	83	66.4	45	76	67.6	48	84	68.4	51	88	70.1	48	83	68.9	47	85	64.7	47	88	68.7	56	88	70.8	44	86	69.9
July	52	83	69.5	56	86	70	52	92	74.5	51	90	72	50	88	73	55	89	78	52	88	70.5	56	89	72.5	62	86	73.4	53	89	71.6	52	90	73.5	52	89	73.9	54	82	70.7	54	88	69.4	60	90	75.7
August	54	82	67.3	44	85	67	54	89	72.7	48	89	70	54	84	70.3	52	90	70.7	46	82	63.8	52	80	68.3	.	.	.	55	87	72.8	62	89	73.5	48	82	68.5	56	84	69	56	80	64.5	54	86	71.8
September	34	86	65.5	36	81	61	34	83	62.5	30	78	59	.	.	.	40	87	65.6	40	86	63.3	42	84	66.5	38	82	63.8	.	.	.	47	84	68.8	40	81	62.8	36	78	59	42	79	60.5	40	82	62.7
October	21	70	44.5	22	72	47	26	74	45.5	28	79	57.7	.	.	.	26	73	48.3	28	73	56.6	22	66	46.1	26	68	47.8	26	68	51.6	31	74	52.4	27	73	51.1	32	68	51.8	36	66	50.8	30	74	51.8
November	10	64	35	22	66	44	9	60	35.7	2	54	35	15	73	39.6	20	62	41.1	2	68	33.6	21	59	37.8	12	68	42.2	9	65	41.3	16	66	45	16	70	45.3	22	52	36.2	22	72	48.3	24	72	44.8
December	1	54	26.3	2	66	32.5	5	49	25.3	2	42	29.2	4	46	29.8	10	58	33.8	1	61	32.3	12	55	34.4	11	52	34.1	12	44	23.7	18	62	37.7	0	58	31.4	19	66	39.4	2	51	29	11	58	31.6
Average			47.4			48.6			47.7			50.6			50.4			51.8			49						54			48.3			52			50.6			51.4			
Peach-trees bloomed	.....			April 30.			.....			March 20			April 4.			April 17.			March 21.			April 28.			April 5.			March 26.			.....			April 13.			April 4.			April 7.			April 22.		
Cherry-trees bloomed	.....			May 2.			.....			.....			April 7.			April 20.			March 30.			May 5.			April 9.			April 11.			April 20.			.....			.....			.....			April 27.		
Apple-trees bloomed	April 30.			May 5.			April 24.			April 27.			April 17.			.....			April 2.			May 6.			April 11.			.....			.....			.....			.....			.....			May 2.		
Average of Thermometer	.....			1836–'37. 29.46			1837–'38. 29.8			1838–'39. 31			1839–'40. 30.9			1840–'41. 26.9			1841–'42. 34.6			1842–'43. 30.6			1843–'44. 32.5			1844–'45. 36			1845–'46. 29.3			1846–'47. 33.3			1847–'48. 34.1			1848–'49. 31.8			1849–'50. 32.2		

OF THE INORGANIC CONSTITUENTS OF FOOD.

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We discover in the bodies of animals the several mineral substances the existence of which are ascertained in vegetables. The bones, as we have seen, contain a large quantity of phosphate of lime; it is requisite, therefore, that the elements of this salt, phosphoric acid and lime, should form part of the ration or diet-roll: this is a point upon which all physiologists are agreed; but the point upon which there is nothing like uniformity yet attained, has reference to the precise quantity of mineral matter which must enter into the constitution of the food.

The analyses of ashes which I have given show that, if vegetable aliments all contain nearly the same inorganic principles, they still contain them in very different proportions: thus, potatoes, wheat, oats, and beans contain much less lime than clover, straw, and peas. The phosphoric and sulphuric acids and the alkalies do not vary less: so that we are led to ask, whether a ration compounded of such and such an article, or of such and such articles, will furnish the animals to which it is supplied with the necessary dose of inorganic principles which must be assimilated daily, and are quite indispensable to maintain them in health and vigor.

It is easy to arrive at the knowledge of the mineral principles which are necessary as elements of the diet, by ascertaining their quantity in the ration, which long experience has shown to be sufficient; yet, as there is reason to believe that, in many cases, mineral substances are present in excess, I have thought that it might be useful to determine by means of analysis the nature and the proportion of the inorganic elements which are actually assimilated by an individual, in order to have a minimum which might serve as a basis for any reasonings or inferences on the subject. My experiments were performed in two opposite circumstances, in which I regard assimilation as most rapid and most complete; videlicit, a calf in full growth, and a milch-cow in calf.

The calf was six months old, and weighed 369 lbs. Some days before being made the subject of experiment, it was fed with hay. During the two days, when it had this fodder ad libitum, it ate 19 lbs.

In the course of the 1st day, the calf passed..... 21.49 lbs. of excrement,
2d day..... 20.39

41.88

which, dried, was reduced to 7.41 lbs.

In the course of the two days, 5.584 lbs. of urine were collected, which, evaporated, yielded 2933.2 grains of extract: the animal having, in the same interval, drunk 45.7 pints of water.

Analysis discovered in 100:

Of the hay, azote	1.6	Ashes	7.6
Of the dry excrements	2.1		12.7
Of the urinous extract	4.0		40.0

Now, if we inquire from these data, in regard to the quantity of azote, and of mineral matters which were consumed with the food, in the course of two days, we have,

In the food, discarding fractions, azote	69.	Mineral substances,	328
In the excrements	50.5		214
In the urine	3.8		38
Together	54.3		252

Therefore azote fixed or exhausted in 24 days..... 14.7 half-drachms.
Mineral substances fixed in two days..... 76 "

The composition of the ashes obtained from the hay and from the excrements shows us approximately both the quantity and the nature of the several inorganic substances which had been assimilated.

The composition of these ashes is as follows:—

	Of the hay.	Of the excrements.	Of the urine.
Acids, Carbonic	9.0	2.0	17.3
Acids, Phosphoric	5.3	5.1	9.2
Acids, Sulphuric	2.4	2.3	7.0
Chlorine	2.3	1.9	9.9
Lime	20.4	16.0	0.9
Magnesia	6.0	6.5	6.0
Potash and soda	17.3	12.5	57.3
Oxide of iron, alumina	1.5	1.0	...
Silica	33.7	51.0	1.2
Loss	2.1	1.7	...
	100.0	100.0	100.0

If the hay consumed contained 328 half-drachms of ash, or mineral matter, the excrements and urine 252 half-drachms of the same matter, the difference between the two sums, 76 half-drachms,* is the quantity of mineral matter fixed in the course of two days, of which 200.6 grains were phosphoric acid, and 494.0 grains were lime.

This quantity of lime, however, is more than four times as much as is necessary to constitute a subphosphate of lime—such as exists in the bones. It is true, indeed, that there is always a quantity of carbonate of lime associated with the subphosphate in bones; 10 of carbonate, for 38 of phosphate, according to Fourcroy and Vauquelin, in those of the ox. Still, the quantity of lime assimilated was vastly more than it ought to have been, had it only gone to assist in the formation of bone. If there was no error in the observations, it is probable that the base in question enters into the constitution of the salts with organic acids, which are encountered in all parts of the animal body.

By a series of weighings, I ascertained that my calf, fed simply upon hay, increased, every day, by a quantity equal to 9725.9 grains troy, in

* The exact quantity is 2392.8 grains troy.

which were included 858.35 grains of mineral substances. The calcareous phosphate and carbonate of the bones, in this quantity, being represented by 262.4 grains, or nearly 3 per cent. of the entire weight acquired in the course of twenty-four hours.

In the experiment with the milch-cow in calf, I limited my inquiries to the phosphoric acid, and the lime taken in and given out. The animal, four years old, was two and a half months gone with calf, and weighed 1452.6 lbs. She had the same allowance, during the experiment, as she had had for several days before, and which, for twenty-four hours, consisted of

Hay	16.5 lbs.
Cut wheat straw	9.9 "
Beet	59.4 "

The experiment was continued for four days, during which the excrements, the urine, and the milk were carefully collected and weighed, and the ashes, both of the food consumed and of the products rendered, were determined by chemical analysis. Suffice it to say, that, representing the quantity of mineral matters assumed into the body, in the course of the experiment, by 849.9 half-drachms, the quantity voided amounted to no more than 5.56 half-drachms. In the quantity assumed, there were 100.2 half-drachms of phosphoric acid, and 203.8 half-drachms of lime. In the quantity voided, there were but 68.2 half-drachms of phosphoric acid, and 116.8 half drachms of lime. This is at the rate of about 8 half-drachms of phosphoric acid, and 22 half-drachms of lime assimilated in the course of twenty-four hours. Here, as in the case of the calf, the quantity of lime assimilated is greatly superior to what it ought to be, in order, by combining with the phosphoric acid, to constitute the phosphate of lime of the bones.

From these inquiries into the nutrition of the calf, and of a cow in calf, it follows that there is a portion of the mineral substance taken in with the food, which remains definitively fixed to concur in the growth, or in the evolution of the individual. In an adult animal, it is to be presumed that no such definitive fixation of inorganic principles takes place, or that it is much less considerable, that in the dejections and several secretions ought to be found the whole of the phosphoric acid, of the lime, &c. taken in with the food; and this presumption is confirmed by experience, for, on instituting an inquiry into the matter upon a horse, it was found that the mineral matters assumed were almost exactly balanced by those discharged. Nevertheless, and granting this to be quite true, which it is, it would be a grave mistake to suppose that an adult animal could go on, for even a very short period of time, upon food that contained no mineral matter. Precisely as in the case of organic matter, it appears that a portion of inorganic matter is also fixed in the living frame, where, for a time, it forms an integral element in the wonderful structure, and a supply of the latter kind is, undoubtedly, no less necessary than is the supply of the former description recognised by all the world.

Were there an inadequate quantity of phosphoric acid, of lime, &c. in the food, there is no question but that the body would speedily feel the effects of the deficiency, and that disease and death would by-and-by put an end to life. So much, indeed, seems demonstrated by the very interesting experiments of M. Chossat, in which he kept graminivorous animals upon a diet rich in azotized principles and in starch, but deficient in lime. From some previous inquiries, M. Chossat had observed that pigeons even

require to add a certain proportion of lime to their ordinary food, the quantity naturally contained in which does not suffice them. Wheat, as we have seen, though it contains a large proportion of phosphate of magnesia, contains very little phosphate of lime, and pigeons, put on this grain, though they do perfectly well at first, and even get fat, begin by-and-by to fall off. In from 2 or 3 months, the birds appeared to suffer from constant thirst; they drank frequently; the fæces became soft and liquid, and the flesh wasted; and, in from 8 to 10 months, the creatures died under the effects of a diarrhœa, which M. Chossat attributed to *deficiency of the calcareous aliment* in the food: and it is neither uninteresting nor unimportant to observe that the same thing occasionally occurs in the human subject, during the period when the process of ossification is usually most active. But one of the most remarkable features of M. Chossat's experiments was observed in the state of the bones of the pigeons; they became so thin and weak that they broke, during the life of the birds, with the slightest force.* The conclusion from this fact is obvious—supplies of all the elements of all the parts of the body are indispensable to the maintenance of health, to the continuance of life.

A pigeon will eat about 463.140 grains of wheat per diem, containing 9.725 grains of ash, in which analysis discovers 4.569 grains of phosphoric acid, and 0.277 of a grain of lime. But this small quantity of lime is incompetent to maintain the bones in their standard condition. I have thought it of moment to insist upon these facts, because I see that they may sometimes come into play in practical rural economy. No breeder or feeder ought to be ignorant of the influence of mineral substances on nutrition.

It is not only indispensable that the allowance of an animal in full growth be sufficient to support and even to add to the soft textures; it must further contain the elements requisite for the nutrition of the osseous system; and it is not impossible but that in managing the feeding of young cattle or young horses in such a way as to reduce to a minimum or to give in excess certain of the inorganic elements of the food, we may succeed in impressing one character or another upon a race. It is even possible that the empirical rules which are acted upon with a view to increase or diminish the quantity of bone, the weight of flesh or of fat, &c., are all connected with various proportions of phosphoric acid, of lime, magnesia, &c. in the food. It will probably be discovered some day, that Bakewell's art is to be explained through the composition of the ashes of the food.

Wheat is not the only alimentary matter that contains an insufficient quantity of lime: maize or Indian corn contains still less; and if that which is grown in the tropics contains as little as that which is produced in Europe, it would be difficult to explain how the grain should answer so well, as it unquestionably does, for food.†

It is true that it is seldom or never consumed alone and without addition; and in South America, where the animals have it largely, I have observed that they frequently eat earth. The habit which certain tribes of the natives have of eating earth, too, which has been particularly remarked upon by travellers and missionaries as an instance of depravation of taste, presents itself to me in quite another light, since I became acquainted with the com-

* Chossat, in Comptes Rendus, t. xiv. p. 455.

† An ash of maize, analyzed in my laboratory by M. Letellier, contained but 1.3 per cent. of lime to 50.1 of phosphoric acid, and 17.0 of magnesia.

position of the ashes of the ordinary article of diet in the countries where it occurs.*

The calcareous and other salts necessary to nutrition, however, are not derived from the food exclusively; the water that is generally consumed contains a quantity which is by no means to be neglected. A horse or a cow, for instance, which drinks from 15 to 45 quarts of water per diem, will, even if the water be as pure as that of the artesian well of Grenoble, take in from 35 to 108 grains of saline matter, in which carbonate of lime predominates. Water that is less free from saline impregnation would, of course, introduce a much larger proportion; some waters, in the quantities above specified, will contain from 138 to upwards of 400 grains of saline matter, one-half of which may be carbonate of lime. And I am here speaking of clear or filtered water; that which is muddy or turbid contains a still larger quantity of earthy matter in suspension than in solution. In an experiment made for the purpose of getting at the amount of earthy matter taken by a milch-cow from the watering-trough in the course of the day, I found that it amounted to about 770 grains troy.

Notwithstanding these facts, it is still doubtful whether the lime contained in ordinary well-water would prove sufficient to supply a growing animal with the material requisite to the formation of its bones; in adults, indeed, changes in the elements of the bones appear to proceed so slowly, that a very small quantity of calcareous matter, probably, suffices to repair losses; but it is otherwise with young and growing animals. I have shown that a calf, six months old, receives with its forage a quantity of phosphoric acid which corresponds to 555.7 grains of phosphate of lime. A calf, a few weeks old, when it has 17 or 18 pints of milk per diem, receives 802.7 grains of mineral substance, into which subphosphate of lime, or bone-earth, enters in the proportion of 370.5 grains. It would be interesting to ascertain what quantities of these substances were assimilated by so young an animal, and at a period when the growth is so rapid that the increase, from day to day, sometimes exceeds two pounds.

The importance of the inorganic principles of the food once recognised, it concerns us to take note of their nature and quantity in the ratio we allow to our domestic animals. It is, in fact, this consideration which has led me to determine the quantities of phosphoric acid and lime contained in the various articles of food the ashes of which have been analyzed. With these data the proportion of bone-earth contained in a given ratio is forthwith perceived.

One thousand parts of the forage, gathered by Bechelbron, in its ordinary state, contained—

* I several times saw children chastised in Indian villages, who had been caught eating earth.

Forage.	Mineral Substances.	Azote.	Phosphoric Acid.	Lime.	Bone-earth.
Hay	66.33	11.50	3.37	10.04	6.96
Potatoes	9.64	3.70	1.09	0.17	0.33
Beet	7.70	2.10	0.46	0.54	0.95
Turnip	5.70	1.30	0.35	0.62	0.72
Jerusalem Potato	12.47	3.75	1.35	0.29	0.56
Wheat	20.51	20.50	9.64	0.60	1.16
Maize	11.00	16.40	5.51	0.14	0.27
Oats	31.74	17.87	4.73	1.17	2.27
Wheat straw	51.90	3.00	1.61	4.41	3.32
Oat straw	35.70	3.00	1.07	2.97	2.21
Clover hay	73.50	21.00	4.63	18.06	9.85
Peas	30.00	38.40	9.03	3.03	5.83
Haricots	35.00	48.80	9.38	2.02	5.94
Beans	30.00	51.10	10.26	1.53	9.27

We seem here to observe a certain relation between the proportion of azote and that of the phosphoric acid contained in the food. The most highly azotized are also those that generally contain the largest quantity of the acid—a circumstance which seems to indicate that in the vegetable kingdom the phosphates are connected more especially with the azotized principles, and that they accompany them in passing into the textures of animals. With the assistance of the above table, it is easy to ascertain the quantity of phosphate of lime which enters into a given ration. Let us take that given to the horses in experiment 3d, in which the half of the hay was replaced by potatoes, one of the articles that contains the smallest proportion of lime, and to find in the

26.6 lbs. of hay, 632.9 grs. phosphoric acid and 1869.9 grs. of lime,
30.8 lbs. of potatoes, 387.7 grs. " 37.9 "

numbers which correspond with 1798.5 grains of bone-earth, and 978.7 grains of uncombined lime.

In his usual allowance, a work-horse at Bechelbron receives,

Hay, 22 lbs. containing 524.8 grs. of phosphoric acid, and 1543.8 grs. of lime,
Straw, 5.5 " 60.7
Oats, 7.2 " 230.2

81.57

In other words, 1735 grains of bone-earth, and 864 grains of free lime.

I have found that very young foals, growing rapidly, and weighing about 374 lbs., consume per diem,

Hay.... 19.8 lbs. containing of phosphoric acid 463 grs., lime 389 grs.
Oats.... 7.2 " " 231 " 58.6

which represents 95 of bone or subphosphate of lime. As a consequence of the relation which appears to exist between the azote and phosphoric acid of an article of sustenance, it comes to pass that like nutritive equivalents also indicate like proportions of phosphoric acid; so that, by introducing a suitable quantity of hay or clover, articles that abound in lime, into the ration, we are always certain of having food favorable to the development of the osseous system, whatever the nature and quality of the other articles that enter into the constitution of the allowance.

The relation of the phosphoric acid to the azote approaches the ratio of 3 to 10 in the more ordinary articles of forage; but the same relation is no longer apparent in the cereals and leguminous vegetables: in grain, and peas, and beans, the phosphoric acid amounts to about a fourth of the azote contained. Thus we have,

	Theoretical equivalent.	Phosphoric acid in the equivalent.
Hay	100	0.34
Potatoes	320	0.35
Beet	548	0.28
Turnip	885	0.31
Jerusalems	273	0.34
Wheat straw	235	0.37
Oat straw	380	0.40
Oats	68	0.32
Maize	70	0.38
Wheat	43	0.41
Haricots	27	0.25
Beans	23	0.24

THE COTTON TRADE, FROM 1825 TO 1850.

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Instead of our annual review of the cotton trade, for a single year, we propose to extend our examinations back to a longer period. For this purpose, we have collected, in our statistical tables, the production, consumption, stocks, and prices of cotton for each year from 1840 to 1850; and, for the more important particulars of the trade, we have gone back as far as 1825. This period of 25 years we have divided into intervals of 5 years, and given the average for each, noting the rate of increase or decrease for each country separately. By taking average results, we get clear of the fluctuations arising from short crops, and other disturbing causes, and are able to observe the general progress, free from those temporary variations which prevent our judging accurately the real changes that are taking place. In this review, we shall see a very prominent place assigned to our country. The United States is now, not only the largest producer, but the largest consumer of cotton: our production has advanced with such rapid strides, that we have distanced all competitors: the cotton goods worn by our people exceed now the amount used by Great Britain and all her dependencies in the four quarters of the globe; and the demands of our manufactories have increased with much greater rapidity than those of any other country in the world. In the table of supplies, (Table I., at the end of this article,) we may observe, that, while other countries have been nearly stationary, our production has advanced with great rapidity. In 20 years, our average crop has increased from 848,000 bales to 2,351,000, or nearly three hundred per cent. If the period of 25 years, from 1825 to 1850, be divided into five equal intervals, the increase for each will be found to be 27, 37, 38, and 15 per cent. In the same time, the production of all other countries has only

risen from 383,000 to 440,000 bales, having absolutely declined, in the last five years, over 16 per cent. In the first period of five years, the crop of the United States constituted 68 per cent. of the whole; in the second, 74; in the third, 77; in the fourth, 80; and, in the fifth, 84 per cent. of the whole. As our bags have increased very much in weight, and are now much larger than those of other countries, our advance has been still greater, and our rank still higher than these figures indicate. If the table of consumption (Table II.) be examined, it will appear that our progress is none the less rapid, in comparison with other countries. In the same 20 years, the deliveries to our manufactories have advanced 325 per cent., viz. from 127,000 bales to 539,000; while, in the same time, the advance of Great Britain has been only 125 per cent., viz. from 653,000 bales to 1,472,000. In each one of these periods, our rate of progress has been more than twice as rapid as hers; and though the absolute amount of our consumption is yet far below that consumed by the English manufacturers, yet, in the last five years, our increase has been 176,000 bales, while theirs has been only 180,000. At present, our consumption is 37 per cent. of the English, while twenty years ago it was only 19 per cent.

France, during all this period, has remained nearly stationary. Twenty years ago, her consumption was 257,000 bales; now, it is only 363,000. In the last five years, she has gone backward, the decline having amounted to 58,000 bales. From 1825 to 1830, the deliveries to her manufactories were double those of the United States; now, they are 33 per cent. less than ours. Her rank, compared with Great Britain, and with nearly every other country in Europe, has also declined. In Spain, Belgium, Germany, Holland, and Russia, the increase has been nearly as rapid as in the United States. In the last five years, their advance (Table III.) has been 46 per cent.; ours, 49 per cent. Their rank in the cotton-consuming countries is yet low, but their rapid progress will soon bring them to a more important position. At present, their consumption is 34 per cent. of that of Great Britain, and the time is not far distant when, taken together, will equal her. Twenty years ago, the comparative rank of the United States, Great Britain, France, and the rest of the continent, was in proportion to the numbers 11, 55, 22, and 12; in the last five years, the percentage of each has been 19, 51, 13, and 17. If France be left out of the comparison, the rank of each, twenty years ago, was as 13, 70, and 17; now, it is as 21, 59, and 20. Although Great Britain requires for her manufactories more than half of all the cotton worked up in Europe and America, the amount actually used by her people, including all that is exported to India, British America, Australia, and all the colonial dependencies of Great Britain, is less than the amount used in the United States. This has been shown to be true for the last four years; and the present year, although it exhibits an apparent decline in our home consumption, forms no exception to this result. The enlarged imports of cotton goods imported into our seaports, compensate, in part, for the falling off of the wants of our factories. If we compare the progress in the demand and supply, it will be seen that, during the last five years, the consumption has increased much faster than the production—the one having advanced 19 per cent. and the other only 9. This might be inferred from the decline in the stocks, but it will be more satisfactory to consider the average production and consumption of the last ten years. The average amount taken by the manufacturers, from 1840 to 1845, was 2,414,000 bales, and, from 1845 to 1850, 2,869,000 bales, showing an in-

crease of 465,000 bales; while the supply advanced from 2,561,000 bales to 2,791,000, with an increase of only 230,000 bales. When it is remembered that the last period embraces the year 1847, when, from the revolutions in Europe, the consumption declined over 600,000 bales, and the years 1845 and 1849, when the American crop so far exceeded its usual average, this result will be more striking and important. The table of stocks (Table IV.) confirms and establishes this same result. At the end of 1844, the cotton on hand in Europe was 1,101,000 bales; at the end of 1849, it was only 646,000 bales.

It may be further observed that the increase in the supply, during the last five years, has been slower than the natural increase of laborers. The advance in the one has been only 9 per cent., and in the other 12 or 13. As many new hands have been brought to the Southern States during this period, the rate of increase in the working force of the cotton-growing States has been still greater than 12 or 13 per cent. This excess has occurred at no former period. From 1825 to 1850, the increments for each period of five years have been 18, 32, 33, and 9 per cent.; always above the increments of population, except in the last interval. It follows, from this, that labor and capital have found other modes of employment more attractive and profitable than the raising of cotton. It is well known that this has been to some extent true in the United States, but it has been more evident and striking in India and Brazil. In these countries, the crop has declined 16 per cent. in the last five years. From Brazil, it has declined regularly for the last twenty years, and the recent advance in coffee will tend still more to divert labor from the production of cotton. The abolition of the discriminating duty in favor of East India cotton, by Sir Robert Peel, and the very low prices which have recently prevailed, have not only stopped any increase in the imports of Surat and Madras, but turned the current in the opposite direction. The advance in the fifteen years before 1845 was 10, 80, and 60 per cent., in each interval of five years; but, from 1845 to 1850, the decline has been 24 per cent. It may fairly be deduced, from this, that the prices of the last five years have not afforded sufficient encouragement to production, and that the planters may now look for a permanent improvement in prices. The table of prices (Table V.) shows that for the last five years the average price at the seaports of the United States has been seven cents and three mills; and it may be expected, with confidence, that they will not rule so low hereafter—that the average rates will not merely experience a temporary rise, as if caused by the short crop and the small stocks of the present year, but a permanent and continued advance.

The table of stocks (Table IV.) represents the amounts on hand in the seaports of Europe continually increasing from 1840 to 1850, while during the four years ending 1849, they have been nearly stationary. Comparing them with the wants of the manufacturers, as is done in the column which contains the number of weeks that the stocks would supply the consumption of the factories, the supply was a trifle lower at the close of 1849, after the receipt of the largest crop ever brought to market, than it had been during the last ten years. The number of bales was a little greater than at the close of 1848; but the time this stock would supply the wants of the manufacturers was a little less. After this review of the history of the trade in cotton for the last ten years, if we remember that the production of 1850 has been much below the average of the last five years, and that the

prospects of the next year's crop are but a little better, it is evident that the present advance in cotton is founded upon no speculative basis, but on the unchangeable laws of supply and demand. Two short crops are succeeding each other, while the stocks on hand are very much reduced. To this, it may be added, that every thing is favorable to a large consumption. Peace everywhere prevails, except in the unimportant Duchies of Schleswig Holstein. Money is abundant, and the currency everywhere undisturbed. Food is very cheap. The present harvest of Europe, as well as the last, is much above an average. Thus, while stocks are low, and the supply small, the demand is large. Prices, therefore must maintain a high level, unless commotions in France, or some unforeseen event of commanding importance, interferes with the regular operation of commerce. In considering the supply and demand of the coming year, we must, therefore, base all our estimates on high prices. The receipts from India and Brazil, and the consumption in Europe and America, will all be affected by this fact. If the advance were slight, it would not experience any sensible check; but when the price has risen to its present rate, (13½ cents for middling fair, Savannah, October 23d,) an advance of 85 per cent. over the average of the last five years, the amount purchased even in our country may be expected to decline. The supply for 1851 will probably exceed that of 1850, not only from the United States, but from India and Brazil.

The past season here has been unfavorable for the growth of cotton; but its disasters, especially in the West, have not been as severe as in the preceding year. In South Carolina and Georgia, there will be a decided decline. The late cold spring, and the long drought in June and July, left the plants small, and the bolls few and scattering. The severe storm on the 24th of August blew out on the ground much open cotton, and prostrated and twisted the stalks so much that there has been no late crop of forms to mature in October. September was a beautiful season for gathering, and so was much of October. There are some plantations where the crop is very fine. The hot summer favored a rapid growth, and repaired, in part, the injury done by a late spring. The general drought was, at some places, relieved by local showers, which brought out some superior crops. The amount of land planted was greater than ever. The receipts at Charleston and Savannah will also be increased by the extension of the Georgia Railroad to the Tennessee River. Were it not for this last cause, a falling off of 100,000 bales might be anticipated. With this, the deficiency will not probably exceed 70,000 or 80,000; and the receipts of these two ports may be expected to reach 650,000 bales. From Alabama, the reports have not been so disastrous. The spring was late, and the stand poor; but the dry summer prevented the ravages of the worm, which had done so much damage the preceding year. The river floods had also done harm the last season; and these they have escaped. The prairie lands have not suffered so much with rust as before. On the Tombigbee, and also on the Black Warrior, the prospects of the planters are very much above those of last year. On the Alabama, the promise is about the same as last year. Still, the disasters have been severe, and the crop will be below an average. An increase of 90,000 or 100,000 bales in the receipts at Mobile, including the Montgomery shipments to New Orleans, may, with confidence, be anticipated. From Florida, a slight increase may be looked for. The amount of land planted has been considerably enlarged, and the drought has not been as general as in the eastern part of the cotton region. At New Or-

leans and in Texas a gain may be looked for. The failure, last year, was so great, that it is almost impossible to expect a like deficiency again. From Louisiana, Arkansas, and the greater part of Mississippi, the reports have been better than last year. The early frost of October 6th injured not a little of the cotton as far north as Memphis; but in general, even in Tennessee, the plant remained green and flourishing, till the general frost at the close of the month. The production of Tennessee and North Alabama will fall below that of last year, and a portion of this will not reach New Orleans. The crop was everywhere backward, but the hot, dry summer helped to repair this damage, and by keeping off the caterpillar and bollworm, permitted the forms to mature. The severe storms, that did so much harm in Florida and the Atlantic States, did not extend so far to the west. The season for gathering has been very fine, and the time of frost late enough to mature nearly every boll that could make cotton. The average receipts at New Orleans, for four years past, have been 943,000 bales; and this period includes two short and two full crops. For the present year, I would estimate them at 850,000 bales. Combining these estimates, the whole supply from the United States will amount to 2,200,000 bales, (see Table VI.) which is about 100,000 in advance of the last five years. The receipts from India have increased very much during the present year, under the stimulus of high prices, and they are destined to advance still more for the coming season.

The purchases now making in Bombay for the English market are reported to be large; and when the new crop begins to arrive at the seaports, the current will turn still more strongly towards England. Not only is their production enlarged by high prices in Europe, but a larger portion of the crop is diverted from China, and from domestic use, for the Western markets.

The average imports into Great Britain for the last 3 years have been 211,000 bales; but for the first 9 months of the present year, they have reached 128,000 bales for Liverpool alone; and for the whole year, for all the ports, they will probably reach 300,000 bales. For 1851 not less than 325,000 bales may be anticipated. This is higher, much higher than any former year. The year 1841 was the largest before 1850, and then the amount was 275,000 bales. The high prices that are now prevailing, and that are likely to prevail for the present season, authorize us to expect an increase even over the present year. (Table VII.)

From Brazil, Egypt, and other places, an advance over the usual average may also be looked for. The average imports into England from 1845 to 1849 were 175,000 bales; but for the present year, the amount will exceed 260,000 bales, and for 1851 will be still larger. (Table VIII.) If we estimate them at 275,000, the whole supply from all these sources (Table IX.) will reach 2,800,000 bales. In reference to the consumption, we may remark that the purchases for our home manufactories have declined during the present year over 30,000 bales. The high price of the raw material, the low duties on foreign goods, and the immense imports of cotton fabrics from England, have caused this retrograde movement. In 1849, there was a falling off of 14,000 bales, so that our consumption is now 44,000 bales below that of 1848. Doubtless the stocks in the hands of the manufacturers are very small, and a slight advance in goods would set all the mills at work again. The universal prosperity of the country forbids us to expect the extension, or even the continuance of this depression. For 1851, I would estimate the demand at 500,000 bales, which is 11,000 above the consump-

tion of the present year, (Table X.) and 13,000 below the average of the last year. In Great Britain, the falling off in the purchases of the manufacturers have been very slight, (Table XI.) and as the reported purchases last year were 80,000 or 90,000 bales above the actual deliveries to the manufacturers, the real deficiency is less than the apparent. For the present year, the consumption in Great Britain will not be below 1,500,000 bales, against 1,588,000 in 1846, and 1,491,000 in 1848. Every thing has been favorable to a large consumption, except the price of the raw material. Money has been abundant—food of all kinds cheap—and labor well rewarded. These elements of prosperity have not been confined to Great Britain, and therefore her exports of cotton goods have been unprecedentedly large. The home and foreign demand being both good, the factories have run full time, in spite of the high price of cotton. This never occurred before, and cannot be expected again with any considerable confidence. At every former period, an advance in the raw material has checked the demands of the factories, and lessened the purchases of the consumers. For the coming year, every thing is fully as favorable as the last; and, if these favorable tendencies have counteracted the tendency of high prices in the raw material, it will be proper to expect the same for 1851 as for 1850. We may, therefore, set down 1,500,000 bales as the probable English consumption for the next year.

In France, there has been a decided decline (Table XII.) in the deliveries to the manufacturers. Our exports have fallen from 368,000 bales to 290,000, and the stocks on hand the 1st of October were almost exactly the same as last year. The purchases at Havre for the first 9 months of the present year have been 249,000 bales, against 290,000 in 1849. From these figures, we cannot estimate the consumption of American cotton for the present year higher than 300,000 bales, against 351,000 for 1849. No advance on this can be expected for the next year, nor is there any reason to anticipate any appreciable decline. For the rest of Europe, we have the exports from the United States for the present year, 194,000 bales, and the exports from Liverpool up to October 11th, 193,000 bales. The whole English exports of 1849 were 254,000 bales, and as their amount on October 12th was 21,000 more this year than last, the whole exports for the year from all the ports will probably reach 275,000 bales, making the total supply from these two countries of 469,000 bales. As the stocks on hand on the continent last year were very low, it is impossible to reduce them much lower. They are now, however, at several ports, lower than last year, so that the consumption will probably exceed 469,000 bales. As this is a decline of over 100,000 bales from 1849, it is not to be expected that so low a limit can be reached for the year 1851. Heretofore, their progress has been forward and rapid, and, were it not for high prices, this would continue. If we estimate their wants for 1851 at 500,000 bales, we have the total consumption (Table XIII.) of 2,800,000 bales—the same as the supply. As the stocks are now much lower than last year, (Table XIV.) and as they were then very low, they will bear no further reduction without a material advance in prices. On the contrary, any decline in price would immediately permit the consumption to expand, not only in France and the rest of the continent, but even in England. We may expect, therefore, that the present high range of prices will be maintained.

The review that has been taken of the supply and the demand shows that the present advance in cotton is the result of no speculative movement, but

that it is based on the immutable laws of trade. The long prevalence of low prices has stimulated consumption and diminished production, until the stocks on hand have fallen to an extremely low limit. Exactly at this point, an unfavorable season has lessened the crop, and an abundant harvest and every other element of general prosperity have encouraged the demand. We congratulate the planters on the handsome returns they are receiving for their crops, and we may extend our congratulation to the whole country, for what benefits them is a benefit to all.

TABLE I.—*Supply of Cotton, (in thousand bales.)*

YEARS.	U. S. Crop brought to Seaports.	U. S. consumed in the South.	Total United States Crop.	East India Imports into Great Britain.	Brazil, etc. Imports into Great Britain.	Brazil, etc. Imports into other places.	Total besides United States.	Total, all kinds.
1840	2178	50	2228	216	146	111	474	2701
1841	1635	55	1690	275	166	128	569	2259
1842	1684	55	1739	255	124	166	545	2284
1843	2379	60	2439	182	165	176	523	2962
1844	2030	60	2090	134	197	80	511	2601
1845	2395	65	2460	150	201	105	461	2921
1846	2101	70	2171	95	155	69	319	2490
1847	1779	80	1859	254	135	122	481	2340
1848	2348	90	2438	228	137	36	401	2839
1849	2729	100	2829	182	245	111	538	3367
Average from 1825 to 1830	838	10	848	73	211	99	382	1231
" " 1830 to 1835	1055	20	1075	81	186	108	375	1450
" " 1835 to 1840	1440	35	1475	144	196	104	444	1919
" " 1840 to 1845	1981	56	2037	232	160	132	524	2561
" " 1845 to 1850	2270	81	2351	177	175	88	440	2791
Increase per cent. in 20 years	171	.....	177	142	17	.....	15	117
" " 15 years	115	.....	119	118	8	.....	17	99
" " 10 years	58	.....	59	23	11	.....	1	40
" " 5 years	15	.....	15	24	9	.....	16	2

TABLE II.—*Consumption of United States, Great Britain, France, and of Europe and America, (in thousand bales.)*

YEARS.	United States, north of Richmond.	United States, Total for.	Total for Great Britain.	United States Cotton in France.	Total for France.	Total for these three.	Total for Europe and America.
1840	295	345	1271	374	440	2056	2370
1841	297	352	1158	368	422	1932	2252
1842	268	323	1207	364	442	1972	2310
1843	325	385	1385	351	409	2179	2573
1844	347	407	1438	385	392	2237	2564
1845	389	454	1574	351	419	2447	2918
1846	423	493	1574	360	403	2470	2968
1847	428	508	1131	252	293	1932	2296
1848	532	622	1491	276	303	2416	2901
1849	518	618	1588	351	399	2605	3264
Average from 1825 to 1830	117	127	653	.....	257	1037	1187
" " 1830 to 1835	175	195	876	.....	269	1340	1540
" " 1835 to 1840	240	275	1069	.....	349	1693	1943
" " 1840 to 1845	307	363	1292	.....	421	2076	2414
" " 1845 to 1850	458	539	1472	.....	363	2374	2869
Increase per cent. in 20 years	290	325	125	.....	41	129	142
" " 15 years	161	176	68	.....	35	77	86
" " 10 years	91	96	38	.....	4	40	48
" " 5 years	59	49	14	.....	14	14	19

TABLE III.—*Consumption of Europe and America, omitting England, France, and United States, (in thousand bales.)*

YEARS.	Exports from United States.	Exports from Great Britain.	Direct Imports from Egypt.	Stock, Jan. 1.	Stock, Dec. 31.	Consumption.
1840	182	123	49	72	112	314
1841	106	116	74	112	88	320
1842	132	138	88	88	108	338
1843	194	119	118	108	145	394
1844	144	141	23	145	26	237
1845	85	122	37	126	99	471
1846	205	194	26	99	26	498
1847	169	215	81	26	87	404
1848	255	192	9	87	58	485
1849	322	254	63	58	38	659
Average from 1840 to 1845	.....	.....	.....	.....	.....	338
" 1845 to 1850	.....	.....	.....	.....	.....	495
Increase per cent. in five years	.....	.....	.....	.....	.....	46

TABLE IV.—*Stock 31st December, (in thousand bales.)*

YEARS.	Liverpool.	Great Britain.	Week's Consumption in Great Britain.	Havre.	France.	Rest of the Continent.	Whole of Europe.	Week's Consumption.
1840	366	464	18	80	97	112	673	17
1841	430	538	24	90	135	88	761	21
1842	457	561	24	109	138	108	807	21
1843	654	786	9	101	125	145	1056	25
1844	745	897	32	53	78	126	1101	26
1845	885	1057	35	52	65	99	1221	26
1846	439	547	18	25	47	26	620	13
1847	364	451	16	43	53	87	591	17
1848	393	498	17	20	31	58	587	13
1849	468	559	18	38	49	38	646	18

TABLE V.—*Amount, Value, and Price of American Cotton.*

YEARS.	Exports, in millions of pounds.	Value, in millions of dollars.	Price of Exports.	Whole Crop of United States.	Value of United States.	Liverpool Prices of Uplands, in pence.
1840	744	64	8.6	391	77	6
1841	530	54	10.2	684	70	6 1/4
1842	577	48	8.1	704	58	5 3/8
1843	817	49	6.0	988	59	4 3/8
1844	664	54	8.1	857	69	4 7/8
1845	873	52	6.0	109	61	4 3/8
1846	548	43	7.9	901	71	4 7/8
1847	527	53	10.1	771	78	6 3/4
1848	814	62	7.6	1011	77	4 1/4
1849	1027	66	6.5	1174	76	5 1/8
Average from 1825 to 1830	219	28	12.8	288	37	7 1/4
" 1830 to 1835	312	34	10.9	387	42	7 1/4
" 1835 to 1840	446	64	14.4	560	81	8 1/2
" 1840 to 1845	666	54	8.1	825	67	5 1/2
" 1845 to 1850	754	55	7.3	972	71	5 1/8

TABLE VI.—*United States Crop.*

	RECEIPTS.			ESTIMATE.
	1848.	1849.	1850.	1851.
Texas, bales	40,000	39,000	31,000	50,000
New Orleans	1,191,000	1,094,000	782,000	850,000
Mobile	436,000	509,000	351,000	440,000
Florida	154,000	200,000	181,000	190,000
Georgia	255,000	391,000	344,000	300,000
South Carolina	262,000	458,000	384,000	350,000
Other places	10,000	28,000	24,000	20,000
Total	2,348,000	2,729,000	2,097,000	2,200,000

TABLE VII.—*English Imports from East Indies.*

	Imports.	Remarks.
	Bales.	
1835 to 1840, average	144,000	High prices.
1840 to 1845 "	232,000	Chinese war.
1845 to 1850 "	177,000	Peace, and low prices
1848, Oct. 6, to Liverpool	93,000	Moderate prices.
1849, Oct. 5, "	69,000	Low prices.
1850, Oct. 4, "	128,000	High prices.
1848, whole year	228,000	Moderate prices.
1849, "	182,000	Low prices.
1850, estimate whole year	300,000	High prices.
1851, " "	325,000	High prices.

TABLE VIII.—*English Imports from Brazil, Egypt, etc.*

YEARS.	About 1st October. Liverpool.	Whole Year. Great Britain.
	Bales.	Bales.
1846	121,000	155,000
1847	75,000	135,000
1848	94,000	137,000
1849	178,000	245,000
1850	203,000	260,000
1851	.....	275,000

TABLE IX.—*Supply of Cotton.*

	1849.	1850.	1851.
	Bales.	Bales.	Bales.
Crop of United States	2,729,000	2,097,000	2,200,000
English imports from East Indies	182,000	300,000	325,000
" " " other places	245,000	270,000	275,000
Total from these sources	3,156,000	2,667,000	2,800,000

TABLE X.—*United States Consumption.*

YEARS.	Amount Consumed.	Average for 3 years.	Inc. per cent. per annum.	Inc. per cent. for 3 years.
1846	423,000	386,000	9.0	23
1847	428,000	413,000	7.0	32
1848	532,000	461,000	11.5	30
1849	518,000	493,000	7.0	28
1850	488,000	515,000	4.0	24

TABLE XI.—*Deliveries to the Trade at Liverpool.*

	1849.	Consumption each week.	1850.	Consumption each week.
	Bales.	Bales.	Bales.	Bales.
March 8	324,000	36,000	227,000	25,222
April 12	433,000	30,929	338,000	24,143
May 10	562,000	31,222	501,000	27,833
June 21	748,000	31,167	672,000	28,000
July 6	835,000	30,926	742,000	28,222
August 9	1,037,000	32,206	907,000	28,942
September 6	1,141,000	31,694	981,000	28,029
October 4	1,220,000	30,500	1,886,000	27,150
November 11	1,287,000	31,390	1,116,000	27,219

TABLE XII.—*Deliveries to the Trade at Havre.*

	1849.	Consumption each month.	1850.	Consumption each month.
	Bales.	Bales.	Bales.	Bales.
May 1	120,141	30,035	104,728	26,182
July 1	193,971	32,328	167,653	27,942
August 1	243,040	34,720	200,650	28,664
September 1	279,541	37,442	332,190	29,024
October 1	290,585	36,328	249,707	27,523

TABLE XIII.—*Consumption.*

	1849.	1850.	1851.
Great Britain, all kinds	1,588,000	1,500,000	1,500,000
France, of American cotton	351,000	300,000	300,000
The rest of the Continent	596,000	470,000	500,000
Total	2,535,000	2,270,000	2,300,000

TABLE XIV.—*Stocks at Recent Dates.*

	1849.	1850.
	Bales.	Bales.
Liverpool, October 12	583,000	482,000
Havre, October 9	46,000	46,000
United States, September 1	155,000	168,000
Hamburg, October 1	5,000	2,000
Total	788,000	698,000

[*Merchants' Magazine.*

THE POTATO-ROT.

We find the following article in the Boston Journal:—

"From all quarters of the State, we hear of the prevalence of the potato-rot. It seems to be more virulent in its operation and injurious in its effects than in former years; for now, in large fields, scarcely a potato can be found that is sound. One man, in Newton, lately offered a field of three acres for $5, and could not find a purchaser. In several towns in Middlesex county, there is not a field where the potatoes are untainted. We have already mentioned that in Essex county, and in the western part of the State generally, the potato is found to be very generally rotten; so much so as to threaten its almost entire destruction, unless the disease is soon arrested."

In Plymouth county, also, the blight has appeared, it is said, in nearly every farm in the upper part of the county. The Plymouth Memorial says:—

"It is confined principally to one or two varieties: the Chenangoes and the pink-eyes, or calicoes, are nearly all which have yet, to our knowledge, been affected. The former has, ever since the first appearance of the rot, some years since, been the most affected, and we should think it advisable to relinquish its culture, at least, for the present."

In Barnstable county, likewise, this mysterious rot has made its appearance. The Sandwich Observer says:—

"The potato rot has reappeared in this town, and is thought to be doing greater injury than it has done in any preceding year. The potatoes, in some fields, will hardly pay for the digging. When they come out of the ground, many of them look fair and sound, but an inside inspection shows their rottenness."

We have, also, accounts of the prevalence of the disease in New Hampshire:—

"In Rockingham county, N. H., the rot has suddenly taken hold of the potatoes, and the crop is very seriously injured, if not totally cut off. One patch of eight acres, which was calculated to produce 2000 bushels, is wholly lost. In Greenland, some potato fields are being ploughed up. In Rye and Newington, the disease is felt to the same extent."

The Portsmouth (N. H.) Journal says:—

"The loss of potatoes, in towns adjoining this city, cannot be much short of $100,000, should the crop utterly fail, as the present prospect seems to indicate."

From Rhode Island, we have a similar report. The Providence Journal says:—

"We regret to learn that this disease has suddenly appeared in this quarter. A few days ago, the potatoes looked finely. But now, we hear of their decay in all directions, and many fields, which promised a large yield, will not be worth digging."

SUGAR-CLEANSING MACHINE.

The New Orleans "Crescent" thus describes the operation of "Hurd's Patent Centrifugal Machine," which is represented to be an important invention to sugar-planters, both in the saving of time and sugar, as well as improving its quality.

The machinery is propelled by steam. The process is as follows:—The dark mixture of sugar and syrup, just as it is taken from the sugar-house coolers, is placed in a cylindrical tub, made of iron, the bottom of which is tight; but the sides or circumference is pierced full of small holes, which are covered over by fine wire-gauze. The cylinder is so arranged that it can be made to revolve on a stationary axle with great rapidity, making from 1000 to 1500 revolutions in a minute—or a speed of 2 or 3 miles per minute. The sugar, as soon as the machine begins to revolve, gradually leaves the bottom of the cylinder and attaches itself to the circumference. The motion continues; and if the wire-gauze were not strong enough, the sugar would break it and escape. The crystals, however, are retained by the fine network of the wire, but the molasses or syrup is driven by centrifugal force through the wire, and is projected with power and rapidity into an outside case, arranged to retain and collect it. In the course of a short time, varying from 5 to 10 minutes, the molasses has been thrown off, and the sugar is drained and fit for shipping, being much drier than when usually put on board. The syrup is now ready to be boiled a second time, before the air or heat has had any influence upon it, and another crop of crystals can be obtained, which can be subjected to the action of the machine; and the syrup coming from this second operation can be treated a third time, until its strength is exhausted.

ANALYSIS OF THE APPLE.

BY J. H. SALISBURY, M. D.

This examination was entered into with the view of throwing some light upon the composition of the apple. To determine whether or not it contained a sufficient percentage of nutritious matter to render it profitable as food for stock. That it has been used with a good degree of success in many instances, for several years, is well known; but it is by no means generally conceded that the apple is so nutritious as it actually is. Those who have had some experience in feeding good varieties, will find in the following analysis the reason of their favorable opinion of this valuable product of the farmer—valuable, because, if properly managed, the crop is sure, large, rich, and attended with less labor and expense than almost any other.

It was the intention to have analyzed several varieties of sweet apples; but, owing to the lateness of the season before the examination was commenced, and the scarcity of these varieties, I was unable to obtain any except the Tolman Sweeting.

Percentage of Water, Dry Matter, and Ash.

	Pulp of the Swaar.	Skin or Epidermis of the Swaar.
Percentage of Water	84.75	61.20
" Dry matter	15.25	38.80
" Ash	0.26	0.72
" Ash calcined on dry matter	1.705	1.856

Percentage of Water and Dry Matter.

	Tolman Sweeting.	Roxbury Russet.	Kilham Hill.	English Russet.	R. Island Greening.
Percentage of Water	81.52	81.35	86.31	79.21	82.85
" Dry matter	18.48	18.65	13.69	20.79	17.15

The above results were obtained the 1st of March. The per centage of water in the six varieties examined, ranges from 79.21 to 86.31 per cent. The Kilham Hill contains the most; the Swaar stands next; the Greening third; and the English Russet has the least. The percentage mean from the six results is 82.664.

The percentage of inorganic matter in the apple is small, not much exceeding that of the richer grains. Like the ash of wheat and corn, it is obtained free from coal with some difficulty, on account of its fusing at a low red-heat.

Composition of the Ash.

	SWAAR.		KILHAM HILL.	
	With carbonic acid.	Without carbonic acid.	With carbonic acid.	Without carbonic acid.
Carbonic acid	17.62	.....	16.17	.....
Silica	1.43	1.750	1.34	1.693
Phosphate of iron	1.82	2.227	1.52	1.838
Phosphoric acid	11.51	14.083	11.51	13.922
Lime	4.05	4.956	2.48	2.999
Magnesia	1.46	1.786	1.14	1.379
Potash	34.34	42.016	29.62	35.821
Soda	15.77	19.295	21.40	25.826
Chlorine	1.71	2.092	1.93	2.334
Sulphuric acid	5.44	6.656	6.52	7.893
Organic matter thrown down by nitrate of silver	4.20	5.139	5.20	6.290
	99.35	100.000	98.84	100 000

Composition of the Ash.

	ROXBURY RUSSET.		ENGLISH RUSSET.		R. ISLAND GREENING.	
	With carbonic acid.	Without carbonic acid.	With carbonic acid.	Without carbonic acid.	With carbonic acid.	Without carbonic acid.
Carbonic acid.....	14.11	.....	10.12	.....	18.03	.....
Silica	1.95	2.278	0.94	1.051	1.15	1.412
Phosphate of iron	1.34	1.564	0.96	1.062	1.04	1.277
Phosphoric acid.....	13.81	15.057	9.94	11.110	9.49	11.664
Lime	4.16	4.857	2.92	3.263	3.60	4.421
Magnesia	1.63	1.903	0.97	1.068	1.80	2.211
Potash.....	29.51	34.958	34.27	38.323	31.31	38.440
Soda	21.13	25.173	27.20	30.408	18.55	22.781
Chlorine	1.97	2.300	1.65	1.848	1.85	2.272
Sulphuric acid	5.84	6.889	5.98	6.648	6.53	8.019
Organic matter thrown down by nitrate of silver	4.30	5.021	4.64	5·187	6.11	7.508
	99.75	100.000	99.59	100.000	99.46	100.000

The analyses are inserted both with and without the carbonic acid. They were calculated without it, in order to show the real composition of the inorganic matter of the fruit. The carbonic acid is formed during the combustion of the inorganic matter, and hence cannot be regarded as a constituent part of the apple, except in very minute quantity.

In silica the apple is by no means rich, containing, in the varieties examined, from about 1 to 2.3 per cent. The mean percentage of the five results is 1.637. The phosphate of iron ranges from about 1 to 2.2 per cent.; the phosphoric acid, from 11 to 15 per cent.; the lime, from about 3 to 5 per cent.; the magnesia, from about 1 to 2.2 per cent.; the potash, from about 35 to 42 per cent.; the soda, from 19.3 to 30.4 per cent.; the chlorine from 1.85 to 2.33 per cent.; and the sulphuric acid, from 6.66 to 8.02 per cent.

The percentage of ash in the apple is small, yet rich in phosphoric and sulphuric acids, potash, and soda. 100 pounds of apple-ashes, deprived of carbonic acid, contain, according to the mean of the foregoing results, about 13 lbs. of phosphoric acid, 7 lbs. of sulphuric acid, 38 lbs. of potash, and 25 lbs. of soda. In other words, these four bodies make up about 83 per cent. of the whole ash.

1000 lbs. of fresh apple contain about 827 lbs. of water, 170.4 lbs. of organic matter, destroyed by heat, and 2.6 lbs. of inorganic matter or ash. 1000 lbs. of dry apple contain between 17 and 18 lbs. of ash.

Mean of the five foregoing Analyses.

	With carbonic acid.	Without carbonic acid.
Carbonic acid	15.210	.....
Silica	1.362	1.637
Phosphate of iron	1.336	1.593
Phosphoric acid	11.252	13.267
Lime	3.442	4.199
Magnesia	1.400	1.669
Potash	31.810	37.610
Soda	20.810	24.799
Chlorine	1.822	2.169
Sulphuric acid	6.062	7.229
Organic matter thrown down by nitrate of silver	4.890	5.828
	99.396	100.000

Proximate Organic Analysis.

	TOLMAN SWEETING.		SWAAR.		KILHAM HILL.	
	1000 parts fresh apple.	1000 parts dry apple.	1000 parts fresh apple.	1000 parts dry apple.	1000 parts fresh apple.	1000 parts dry apple
Cellular fibre	33.90	190.620	18.80	126.685	29.90	229.453
Glutinous matter, with a little fat and wax	3.52	19.793	1.18	7.276	1.73	13.276
Dextrine	28.96	162.890	28.54	192.352	21.72	166.681
Sugar and extract	99.05	557.178	81.04	546.618	59.30	455.069
Malic acid	2.50	14.061	3.82	25.737	3.46	26.552
Albumen	8.96	50.452	13.08	88.125	13.17	101.066
Casein	0.89	5.006	1.96	13.205	1.03	7.904
Dry matter	177.79	1000.000	148.42	1000.000	130.31	1000.000
Water	815.20	.....	847.50	.....	863.13	.....
Loss	7.01	.....	4.08	.....	6.56	.....
	1000.00		1000.00		1000.00	

Proximate Organic Analysis.

	ROXBURY RUSSET.		ENGLISH RUSSET.		R. ISLAND GREENING.	
	1000 parts fresh apple.	1000 parts dry apple.	1000 parts fresh apple.	1000 parts dry apple.	1000 parts fresh apple.	1000 parts dry apple.
Cellular fibre	31.20	173.623	44.78	220.929	33.58	204.000
Glutinous matter, with a little wax and fat.	1.70	9.460	2.22	10.952	1.32	8.019
Dextrine	36.22	210.558	41.11	202.823	32.07	194.888
Sugar and extract	90.27	502.337	93.46	461.099	76.37	464.061
Malic acid	3.23	17.975	2.98	14.702	3.04	18.485
Albumen	15.03	83.639	16.13	79.579	16.37	99.459
Casein	2.05	11.408	2.01	9.916	1.89	12.088
Dry matter	179.70	1000.000	202.69	1000.000	164.64	1000.000
Water	813.45	.....	792.11	.....	828.46	.....
Loss	6.85	.....	5.20	.....	6.90	.....
	1000.00		1000.00		1000.00	

Besides the above-mentioned bodies, the apple contains a small quantity of tannic and gallic acids. Of the varieties examined, they were found in larger proportion in the Russets than in either of the others. To these acids this fruit owes that peculiar astringency, so strikingly developed in some varieties, and easily detected in all, by the taste and by the black color struck through them when cut with a knife, or any instrument made of iron.

Liebig states that starch is found in the unripe apple. I have not been able to detect it in the ripe fruit, except in the Tolman Sweeting, which give a very faint blue with iodine.

A small quantity of white wax is found, which is derived mainly from the epidermis, over which it is spread, imparting to it, in many varieties, a smooth, greasy feel. A little fatty matter is also present, together with a respectable percentage of gluten. The glutinous matter differs from that of the grains, in being less adhesive when moist, and more granular when dry.

The foregoing analyses were made during the months of March and April. The Tolman Sweeting was somewhat shrivelled, and rather past its season: the other varieties were fresh and in good eating order. The Tolman Sweeting, English Russet, and Kilham Hill, were furnished by E. P. Prentice, Esq., of Mount Hope.

Mean of the Six foregoing Analyses.

	1000 parts of fresh Apple.	1000 parts dry Apple.
Cellular fibre	32.03	190.879
Glutinous matter, with a little fat and wax	1.94	11.463
Dextrine	31.44	186.805
Sugar and extract	83.25	497.627
Malic acid	3.17	19.585
Albumen	13.79	83.720
Casein	1.64	9.921
Dry matter	167.26	1000.000
Water	826.64	.....
Loss	6.10	.....
	1000.00	.....

The ripe apple is rich in sugar, and a body analogous to gum, called *dextrine*, which has the same composition as starch, but differs from it in being soluble in cold water, and not colored blue with iodine. It derives its name from the action of its solution on polarized light, it causing the plane of polarization to deviate to the right; hence its name, *dextrine*.

Dextrine and gum should not be confounded with each other. They differ very materially in many respects. The former possesses the property of being converted into grape sugar, by sulphuric acid, and by diastase, while the latter does not. Dextrine belongs to the class of bodies which are susceptible of nourishing the animal body. All the starch taken as food is converted into dextrine before it is assimilated by the system. The acid of the stomach possesses the property of converting starch into this body.

In the fresh apple, 100 lbs. contain about 3.2 lbs. of fibre; 0.2 of a lb. of gluten, fat, and wax; 3.1 lbs. of dextrine; 8.3 lbs. of sugar and extract;

0.3 of a lb. of malic acid; 1.4 lb. of albumen; 0.16 of a lb. of casein, and 82.66 lbs. of water.

In the dry apple, 100 lbs. contain about 19 lbs. of fibre; 1.1 lb. of gluten, fat and wax; 18.7 lbs. of dextrine; 49.8 lbs. of sugar and extract; 2 lbs. of malic acid; 8.4 lbs. of albumen, and 1 lb. of casein.

In the fresh potato, 100 lbs. contain about 9.7 lbs. of starch; 5.8 lbs. of fibre; 0.8 of a lb. of gluten; 0.08 of a lb. of fatty matter; ¼ of a lb. of albumen; 0.45 of a lb. of casein; 1.27 lb. of dextrine; 2.64 lbs. of sugar and extract; and 79.7 lbs. of water.

In the dry potato, 100 lbs. contain about 48.5 lbs. of starch; 29 lbs. of fibre; 1 lb. of gluten; 0.4 of a lb. of fatty matter; 1.25 lb. of albumen; 2.25 lbs. of casein; 6.32 lbs. of dextrine; and 13.2 lbs. of sugar and extract.

By comparing the composition of the apple with that of the potato, it will be noticed; first, that the former contains, according to the above analyses, about three per cent. more of water than the latter. Second, that dextrine and sugar, in the apple, take the place of starch, dextrine, and sugar, in the potato. Of the former, 100 lbs. of good fruit contain of dextrine, sugar, and extract, 11.4 lbs.; the latter has, in the same amount of fresh tubers, 13.61 lbs. of starch, dextrine, sugar, and extract. In the dry fruit, 100 lbs. contain of dextrine, sugar, and extract, 68.5 lbs.; in the same quantity of dry potato, there is, of starch, dextrine, sugar, and extract, 68.02 lbs. The above proximate principles are the main bodies in the apple and potato which go to form fat. In the aggregate amount of fat-producing products, it will be seen that the apple and the potato do not materially differ. It would be natural, however, to infer that 50 lbs. of dextrine and sugar would, if taken into the system, be more likely to make a greater quantity of fat, in a given time, or, at least, to make the same amount in a shorter period, than an equal weight of starch; for this reason, that the two former bodies, although nearly the same in composition with the latter, yet are physically further advanced in organization, and hence probably approximate nearer the constitution of fat. If this view be taken, then the apple, if of good quality, may be regarded equally, if not more rich, in fat-producing products, than the potato. Thirdly, that the apple is richer in nitrogen compounds than the potato. 100 lbs. of fresh apple contain of albumen 1.38 lb; the same amount of fresh potato has ¼ of a lb.; 100 lbs. of dry apple contain 8.37 lbs. of albumen, and an equal weight of dry tubers has 1¼ lb. 100 lbs. of fresh fruit contain of casein 0.16 of a lb.; and an equal weight of fresh tubers, 0.35 of a lb. 100 lbs. of dry apple have 1 lb. of casein; and the same amount of dry potato contains 2½ lbs. Hence it will be observed that 100 lbs. of fresh apple contain of albumen and casein 1.54 lb.; and the same quantity of fresh potato, 0.7 of a lb. 100 lbs. of dry fruit have of albumen and casein 9.37 lbs.; and an equal amount of dry tubers, 3.50 lbs.

From the above, it will readily be seen that, in albumen, the apple is richer than the potato, while in casein the reverse is the case. That the aggregate amount of albumen, casein, and gluten, in good varieties of the apple, is more than double that of the same bodies in the potato; hence the former may be regarded richer than the latter, in those bodies which strictly go to nourish the system, or, in other words, to form muscle, brain, nerve, and, in short, assist in building up and sustaining the organic part of all the animal body.

The juice of the apple forms what was regarded, not long ago, a favorite and almost necessary appendage to the farmer's stock of winter luxuries. It is now, however, looked upon by him with comparative indifference as a beverage, he having found a far better and more profitable use for his apples, that of converting them into fat, instead of alcohol. The juice of the apple, after being fermented, is called cider, and contains much of the nutritive matter of the fruit. Cider contains alcohol, sugar, gum or dextrine, malic acid, and the phosphates and sulphates of the alkalies, with a little tannic and gallic acids. The juice, before being fermented, has, in addition to the above ingredients, albumen and casein.

For the purpose of comparing the composition of the apple with that of several other kinds of fruit, it may not be uninteresting to introduce their proximate organic analyses here, in connection with those of the apple. M. Berard has examined the unripe and ripe cherry, the unripe and ripe peach, the ripe pear, and the unripe and ripe gooseberry, and arrived at the following results:—

	Peach.		Pear.		Cherry.		Gooseberry.	
	Unripe.	Ripe.	Ripe and Fresh.	Kept for some time.	Unripe.	Ripe.	Unripe.	Ripe.
Chlorophyl and coloring matter	0.04	1.10	0.08	0.01	0.05	.....	0.03	.....
Sugar	trace.	16.48	6.45	11.52	1.12	18.12	0.52	6.24
Dextrine	4.10	5.12	3.17	2.07	6.01	3.23	1.36	0.78
Fibre	3.61	1.86	3.80	2.19	2.44	1.12	8.45	8.01
Albumen	0.76	0.17	0.08	0.21	0.21	0.57	1.07	0.86
Malic acid	2.70	1.80	0.11	0.08	1.75	2.01	1.80	2.41
Citric acid	.....	.....	.....	.....	.....	.....	0.12	0.31
Lime	trace.	trace.	0.03	0.04	0.14	0.01	0.24	0.29
Water	89.39	74.87	86.28	83.83	88.28	74.85	86.41	81.10
	100.00	100.40	100.00	99.65	99.00	99.00	100.00	100.00

ANALYSIS OF RHUBARB.

BY J. H. SALISBURY, M. D.

General Remarks.—Of rhubarb, the following are the principal species and varieties in cultivation. The *Rheum rhaponticum*, (common pie-plant,) a native of Asia, introduced into Europe in 1575; *Rheum undulatum*, a native of China, introduced in 1734; Elford rhubarb, or scarlet variety; *Rheum hybridum*, a native of Asia, cultivated in 1778; Giant rhubarb, a variety of the *rhaponticum*; *Rheum palmatum*, or Turkey rhubarb; *Rheum compactum*, and *Rheum australe*.

Besides the above, there are several varieties cultivated in this country, principally derived from the *rhaponticum*. The first five kinds are cultivated entirely for their petioles. Several attempts have been made in the western part of Europe, and in this country, to cultivate the root of the first and last three mentioned sorts, for medicinal purposes; but without

any degree of success. I do not see, however, if the composition of the root and the rest of the plant were well known, together with its habits, mode of culture, time of gathering, &c., why success might not attend its cultivation in the United States as well as in China and Turkey. The root of good Turkey rhubarb commands now in market from $3 to $4 the pound. If it could be successfully cultivated here, it would constitute one of our most valuable and lucrative articles of trade.

Uses.—The large succulent petioles are highly esteemed for making tarts, pies, jelly, preserves, wine, &c., which resemble much those made of apple and gooseberries. The root of several species is highly esteemed in medicine as a cathartic, possessing mild tonic and astringent properties. Among the species used in medicine are the *Rheum rhaponticum*, *R. palmatum*, *R. compactum*, and *R. australe*. The *R. rhaponticum* and several varieties derived from it, are mostly cultivated in this country for their very fine flavored petioles. The root grown in the western part of Europe and the United States is less firm, and acquires much less medicinal value than the root of the same species grown in China, Turkey, and Russia. The reason of this difference is not well known, but is probably owing to soil, climate, time of gathering, and mode of culture.

Composition of the several parts of the plant.—In this country, the several species of rhubarb are cultivated mostly for the petioles, or leaf-stalks. The texture and flavor of these vary greatly with the soil, mode of culture, and climate.

We should naturally infer that the soil in which rhubarb thrives (from its size and rapid growth) must be richly supplied with those materials, in a soluble form, which are found in the various organs and tissues of the plant. It is necessary to know, then, the composition of the plant, before we can positively decide what kind of soil is best fitted to its growth. The following analyses were made with the view of throwing some light upon this subject.

The Giant rhubarb, a very fine variety of the rhaponticum, cut June 1st. Plant in flower. Stout growth. The roots were very compact, and remarkably large. Furnished by Mr. C. N. Bement, of Albany.

Percentage of Water, Dry Matter, and Ash, in the several parts of the plant.

	Root.	Stalk.	Petioles.	Leaf-blades.	Flowers and pedicels.
centage of Water.....	82.000	89.500	93.465	88.00	86.900
" Dry matter	18.000	10.500	6.535	12.00	13.100
" Ash	0.925	1.130	0.940	1.52	1.320
" Ash calcined on dry atter.....	5.194	10.762	14.384	12.75	10.076

The percentage of water in all parts of the plant is large, amounting to m 82 to 93 per cent. The dry matter of the several parts is richly sup- ed with ash. The petioles contain the greatest proportion, and the root e least.

Inorganic Analysis of the several parts of the plant.

	ROOT.		STALK.		PETIOLES OR LEAF-STALK.		LEAF-BLADES.		FLOWERS AND PEDICELS.	
	With carbonic acid.	Without carbonic acid.	With carbonic acid.	Without carbonic acid.	With carbonic acid.	Without carbonic acid.	With carbonic acid.	Without carbonic acid.	With carbonic acid.	Without carbonic acid.
Carbonic acid	12.050	.....	9.400	.....	9.480	.....	14.900	.....	6.050	.....
Silicic	3.950	4.595	0.450	0.511	1.400	1.557	7.600	8.928	5.600	6.147
Phosphates	30.050	34.788	17.200	19.528	22.200	24.702	19.400	22.792	27.500	29.786
Lime	4.785	5.414	3.574	4.056	2.476	2.754	5.740	6.744	1.464	1.607
Magnesia	2.920	3.375	0.200	0.227	0.204	.227	1.160	1.363	0.102	0.112
Potash	7.217	8.349	8.096	9.189	5.287	5.883	7.870	9.247	9.185	10.812
Soda	24.736	28.607	33.261	38.750	33.260	37.015	27.360	32.143	24.471	26.561
Sodium	0.144	0.166	0.973	0.111	1.651	1.837	2.110	2.479	2.110	2.316
Chlorine	2.22	0.255	1.480	1.679	2.516	2.799	3.210	3.772	3.210	3.524
Sulphuric acid	5.155	5.957	10.723	12.171	5.274	5.868	4.270	5.017	10.860	11.891
Organic matter thrown down by nitrate of silver*	7.350	8.494	12.150	13.778	15.600	17.358	6.400	7.515	6.600	7.244
	98.579	100.000	97.507	100.000	99.298	100.000	100.020	100.000	97.152	100.000

* In the essay on Indian corn will be found the method followed in obtaining the organic matter from the ashes of plants. This organic matter, in the paper referred to, is set down as organic acids. This was done from the fact that it seems to be combined with the inorganic bases of the ashes, after the manner of acids. It does not discolor the ashes in the least, and is so firmly united with them, that it is quite impossible to expel it entirely, unless they (the ashes) are kept for some time at a temperature above their point of fusion.

As there has been some objection raised to the name used in the paper referred to above, we will—till it has undergone a more thorough examination—call it organic matter thrown down by nitrate of silver. It may not be improper to state here that some chemists have doubted the presence of this matter in the ashes of plants. We do not blame them—for several reasons—for doing so; but would kindly ask them, before they make their opinions more public, (for their own sakes as well as ours,) to give the subject at least a cursory examination. We seek only for truth, and when it is clearly shown that there is no organic matter in the ashes of plants, which can be determined by the method described in the aforesaid paper, then we will be most willing to acknowledge frankly that we have heedlessly fallen into the ditch of error, our friends kindly endeavoring to keep us out notwithstanding.

The analyses have been calculated without the carbonic acid, (this is not a constituent of the plant, but is formed during the combustion,) to show the real composition of the inorganic matter which actually exists in the plant and is necessary to its constitution. The stalk and petioles contain but a small percentage of silicic acid, while the leaves, flowers, pedicels, and root contain a respectable quantity. All portions of the plant are rich in phosphates, ranging from 19 to 34 per cent. in the several parts. The root contains the most; the flowers and pedicels stand next in order; the petioles next; the leaves fourth; and the stalk contains the least. The lime ranges, in the several parts, from 1½ to 6.7 per cent.; the magnesia from one-tenth of 1 per cent. to 3.3 per cent.; the potash from 5.8 to 10.8 per cent.; the soda from 26.5 to 38.75 per cent.; and the sulphuric acid from 5 to 12 per cent.

The analyses show that the ash of this plant is in a great measure made up of the phosphates and sulphates of the alkalies; these making up from 69 to 79 per cent. of the entire inorganic matter of the plant.

It will be seen from the above, that a soil well suited to nourish and sustain vigorously the rhubarb plant, must be peculiarly rich in the phosphates and sulphates of the alkalies. Bone-dust, plaster, salt, and ashes afford the inorganic bodies required by this plant. Besides these, decomposing animal and vegetable manures are also needed to warm and loosen the soil, and facilitate the decomposition, and consequently the solubility of the inorganic materials.

Proximate organic analysis of the petioles.—Petioles, or leaf-stalks, taken from the plant the first of September: very large and succulent: 1½ inches in diameter, and 2½ feet long. A variety of the rhaponticum, furnished by Mr. Y. Rathbone, of Kenwood.

Percentage of Water, Dry Matter, and Ash.

Percentage of water	87.79
" dry matter	12.23
" ash	2.27
" ash, calculated on dry matter	18.56

Proximate Organic Analysis.

	With water.	Without water.
Fibre, with a little starch and chlorophyl	1.265	9.894
Malic acid and extract, with a little tartaric and oxalic acids	5.710	44.622
Dextrine	0.550	4.302
Fibre	3.235	25.303
Matter separated from fibre by a weak solution of potash, gives the characteristic color of albumen with sulphuric acid	1.605	12.554
Albumen	0.270	2.112
Casein	0.150	1.173
Water	87.770	.....
	100.555	100.000

The above specimen is larger and firmer than the one examined the 1st of June, and contains less water and a greater percentage of inorganic matter. The leaves contain a little oxalic and malic acids. The oxalic acid is probably in the form of binoxalate of potash and soda. The petioles or

leaf stalks have a mild, pleasant acid taste. They contain a large quantity of malic acid, with considerable oxalic, and a little tartaric acid. These acids are most likely in the form of acid salts of the alkalies.

The well-known and highly valued medicine called *rhubarb* is the root of several species of Rheum. It has been analyzed by Schrarder, Brande, Hornemann, M. Ossian Henry, Schlossberger, and Dopping. (*Pereira's Materia Medica, Liebig's Annalen, Thompson's Vegetable Chemistry, U. S. Dispensatory, &c.*)

It contains *Rhein*, (Syn. Rhabarbaric acid, Rhubarb Yellow, Rheumin.) This is a yellow granular crystalline body, somewhat analogous to chrysophanic acid. It is extracted nearly pure from the root by hot sulphuric ether. On carefully evaporating the solution, it is obtained in small crystals, which are quite tasteless, and insoluble in cold water. It imparts to concentrated sulphuric acid a beautiful carmine color: to solutions of ammonia and potash, a fine red; and to soda and lime, a light red hue. It is soluble in ether, alcohol, and acetic acid, to all of which it imparts a deep yellow color: it is less soluble in cold nitric acid, and but slightly soluble in hydrochloric and oxalic acids, all of which it colors yellow. On boiling these latter acids, more is taken up, but is again precipitated on cooling. It is thrown down from an alkaline solution by sulphuric acid in the form of a deep yellow powder, which is nearly or quite insoluble in water. It is precipitated by the acetate of lead on standing for some time. The neutral salt throws it down in the form of light yellow flocs, leaving a clear solution slightly tinged with yellow. The basic salt throws it down in the form of a red flocculent precipitate, leaving a slightly turbid light-red solution.

Aporetin.—A resinous body of a black color, brittle, decomposed at a temperature below its point of fusion.

Erythroretin.—$C_{19}H_9O_7$. A light yellow crystalline, resinous body, soluble in ether and alcohol, and volatilized partially by heat without decomposition. It affords a dull red solution with concentrated sulphuric acid, from which it is thrown down in the form of a flocculent precipitate by water.

Phæoretin.—$C_{16}H_8O_9$. A yellowish brown powder, quite insoluble in ether and water, but readily soluble in alcohol. With the alkalies, it forms a deep red solution, from which it is precipitated by the mineral acids.

Rhaponticin.—A yellow, tasteless, crystallizable body, insoluble in ether, but soluble in a large excess of dilute alcohol. Besides the above, the root also contains chrysophanic acid, a trace of oil or fatty matter, starch, gum, mucilage, sugar, woody fibre, pectin, tannic, gallic, oxalic, sulphuric, and phosphoric acids, together with chlorine, lime, magnesia, silica, iron, potash, and soda.

OXYGEN PER CENT. IN THE OXIDES OF THE INORGANIC ELEMENTS OF PLANTS.

1st.—*Oxygen per cent. in the oxides of the inorganic elements of plants.*

	Oxygen per cent.		Oxygen per cent.
Sulphurous acid	49·85	Alumina	46·70
Sulphuric "	59·86	Silica	51·96
Phosphoric "	56·04	Protoxide of iron	22·77
Potash	16·95	Peroxide "	30·66
Soda	25·58	Protoxide of magnesia	22·43
Lime	28·09	Sesquioxide "	30·25
Magnesia	38·71	Peroxide "	36·64

2d.—*Chlorine or sulphur per cent. in the chlorides and sulphurets.*

	Chlorine per cent.		Sulphur per cent.
Chloride of potassium	47·77	Sulphuret of potassium	29·11
" sodium	60·34	" sodium	40·88
" calcium	63·36	" calcium	44·00
" magnesia	73·65	" iron	37·33
First chloride of iron	56·62	Bisulphuret of iron (iron pyrites)	47·08
Second "	66·19		

3d.—*Composition per cent. of the saline combinations above described.*

	Acid.	Base.	Water.
Carbonate of potash	31·91	68·09	
Bicarbonate "	48·38	51·62	
Sulphate "	45·93	54·07	
Nitrate "	53·44	46·56	
Binoxalate " (salt of sorrel)	52·64	34·29	13·07
Bitartrate " (cream of tartar)	70·28	24·96	4·76
Phosphate "	43·06	56·94	
Biphosphate "	60·20	39·80	
Carbonate of soda (dry)	41·42	58·58	
" " (crystallized)	15·43	21·81	62·76
Bicarbonate "	58·58	41·42	
Nitrate "	63·40	36·60	
Sulphate " (dry)	56·18	43·82	
" " (crystallized)	24·85	19·38	55·77
Phosphate "	53·30	46·70	
Biphosphate "	69·54	30·46	
Carbonate of lime	43·71	56·29	
Sulphate " (gypsum)	46·31	32·90	20·79
" " (burned)	58·47	41·53	
Nitrate "	65·54	34·46	
Phosphate " (apatite)	45·52	54·48	
Biphosphate "	71·48	28·52	
Earth of bones	48·45	51·55	

	Acid.	Base.	Water.
Carbonate of magnesia	51·69	48·31	
Bicarbonate "	68·15	31·85	
Sulphate " (Epsom salts)	32·40	16·70	50·90
Nitrate "	72·38	27·62	
Phosphate "	63·33	36·67	
Sulphate of alumina	70·07	29·93	
Phosphate "	67·57	32·43	
Silicate of potash (soluble)	49·46	50·54	
Bisilicate " "	66·19	33·81	
Silicate of soda "	59·63	40·37	
Bisilicate " "	54·71	25·29	
Silicate of lime	61·85	38·15	
" magnesia	69·08	30·92	
" alumina	72·95	27·05	
Carbonate of iron	38·63	61·37	
Sulphate " (crystallized)	31·03	27·19	41·78
Carbonate of manganese	38·27	61·73	
Sulphate " (crystallized)	32·20	29·54	37·26

VIII. STATISTICAL INFORMATION.

LAKE TRADE OF THE UNITED STATES.

THE following table, derived from an official source, affords a pretty good idea of the magnitude of a portion of the internal trade of the United States. The aggregate valuation of our lake trade, for the year 1850, (imports and exports,) amounts, it will be seen, to the large sum of $186,484,905; or more, by $40,000,000, than the whole foreign export trade of the country. The aggregate tonnage employed on the lakes of the United States is equal to 203,041 tons, of which 167,137 tons is American, and 35,904 tons British.

Total Value of Exports and Imports.

The commerce of Lakes Erie, Huron, Michigan, Ontario, Champlain, and St. Clair, is as follows:—

Erie	$115,785,048	Ontario	$28,141,000
Huron	848,152	Champlain	16,750,700
Michigan	24,320,481	St. Clair	639,524

Showing a total value of $186,484,905, as above stated. To this must be added the passenger trade of the lakes, valued at $1,000,000.

The aggregate value of the tonnage of Lake Erie is	$5,308,085
" " " Lake Huron	75,000
" " " Lake Michigan	564,435

EXPORTS OF ICE FROM BOSTON, IN 1850.

The following table exhibits the total amount of ice, in tons, exported to the under-mentioned ports, during the year ending December 31st, 1850, and the total amount for the five previous years:

East Indies	8,897	Demarara	1,077
Port Louis, Mauritius	616	Matanzas	548
Liverpool	505	St. Johns, Port Royal	365
Havana	5,521	South America	50
Kingston, Jamaica	2,525	Vera Cruz	259
Rio Janeiro	915	Sisal	179
St. Thomas	1,177	Nassau	100
Pernambuco	240	Bermuda	30
Barbadoes	709	Martinique	36
St. Vincents	205	San Francisco	1,299
St. Jago	450	Sacramento City	260
Trinidad	282	Southern ports	43,579
Neuvitas	408	Total	69,623

1845.....48,422 | 1846.....57,293 | 1847.....54,625 | 1848.....57,507 | 1849.....66,308

EXPORTS OF BOOTS AND SHOES FROM BOSTON.

This branch of Massachusetts manufactures appears to have been unusually active and prosperous during the year 1850, as will be seen by the subjoined table, in the increase of exports over previous years. This increase

is attributed, for the most part, to the large shipments to California, either direct from Boston, or via New York, Philadelphia, and Baltimore. The clearances at the custom-house have been as follows :—

	Cases.		Cases.		Cases.
1845	90,782	1847	72,424	1849	101,371
1846	67,887	1848	79,118	1850	147,769

VALUE OF BREADSTUFFS, ETC., EXPORTED FROM THE UNITED STATES.

Statement, exhibiting the aggregate value of Breadstuffs and Provisions, exported annually, from 1821 *to* 1850, *inclusive.*

Years.	Value.	Years.	Value.	Years.	Value.
1821	$12,341,901	1831	$17,538,227	1841	$17,196,102
1822	13,886,856	1832	12,424,703	1842	16,902,876
1823	13,767,847	1833	14,209,128	1843*	11,204,123
1824	15,059,484	1834	11,524,024	1844	17,970,135
1825	11,634,449	1835	12,009,399	1845	16,743,421
1826	11,303,496	1836	10,614,130	1846	27,701,121
1827	11,685,556	1837	9,588,359	1847	68,701,921
1828	11,461,144	1838	9,636,659	1848	37,472,751
1829	13,131,858	1839	14,147,779	1849	39,155,507
1830	12,075,030	1840	19,067,535	1850	26,051,373
		Total			$535,207,285

COMMERCE OF CONNECTICUT.

During the year ending June 30, 1850, there were built, in Connecticut, 3 ships, 7 brigs, 27 schooners, 9 sloops and canal-boats, 1 steamer; total 47; tonnage, 4,820.

The tonnage of the several districts in Connecticut is as follows :—

	Registered.	Enrolled.	Total.
Middletown	95.55	12,033.72	12,129.32
New London	23,364.23	17,120.62	40,484.85
Stonington	13,188.47	6,724.03	18,912.50
New Haven	4,994.65	10,736.70	15,931.40
Fairfield	868.35	13,960.27	14,828.62
Total			103,386.69

FOREIGN COMMERCE OF CHARLESTON, SOUTH CAROLINA.

The exports of Charleston, to foreign countries, during the year 1850, amounted to $12,394,497; being an increase of nearly $1,500,000 over the exports of 1849, and of $4,500,000 on those of 1848. It is gratifying, also, that this increase of exports has been attended with a corresponding increase of imports, as will be seen by the following comparative statement of the duties collected on foreign imports during the years specified :—

* For nine months ending June 30th, 1843.

Duties for the year 1851	$533,706.95
" " 1849	421,774.68
" " 1848	327,893.42
Increase of year 1850 over 1849	$111,932.27
" " 1840	205,813.53

If the goods in the public warehouse had been taken into consumption, the aggregate amount for the past year would have been considerably over $600,000, as the quantity of goods similarly situated at the close of last year was comparatively trifling.

DEPOSITES AND COINAGE AT THE UNITED STATES MINT, PHILADELPHIA.

The coinage at the United States Mint, at Philadelphia, for the year 1850, as stated by E. C. Dale, Esq., Assistant Treasurer, has been as follows:

Gold Coinage.

	Pieces.	Value.
Double Eagles	1,170,261	$23,405,220.00
Eagles	291,451	2,914,510.00
Half Eagles	64,491	322,455.00
Quarter Eagles	252,923	632,307.50
Dollars	481,953	481,953.00
Total	2,261,079	$27,756,445.50

Silver Coinage.

	Pieces.	Value.
Dollars	7,500	$7,500.00
Half Dollars	227,000	113,500.00
Quarter Dollars	190,800	47,700.00
Dimes	1,931,500	193,150.00
Half Dimes	955,000	47,750.00
Total	3,311,800	$409,600.00

Copper Coinage.

	Pieces.	Value.
Cents	4,022,644	$40,226.44
Half Cents	39,812	199.06
Total	4,062,456	$40,525.50
Whole amount coined	9,635,335	$28,206,471.00

Deposites for the Year 1850.

Total gold deposites		$33,150,000
Of which, from California	$31,500,000	
Other sources	1,651,000	
		$33,150,000
Total silver deposites		$428,000
The deposites for the month of December, from California, are about		$4,500,000

The number of gold and silver pieces, and the value of the same, coined at the United States Mint, Philadelphia, for the month of December, 1850, was as follows:—

Gold Coinage.

	Pieces.	Value.
Double Eagles	189,821	$3,796,420.00
Quarter Eagles	45,000	112,500.00
Dollars	78,098	78,098.00
Total	312,919	$3,987,018.00

Silver Coinage.

	Pieces.	Value.
Quarter Dollars	66,800	$16,700.00
Dimes	115,000	11,500.00
Half Dimes	290,090	14,500.00
Total	471,800	$42,700.00

Copper Coinage.

	Pieces.	Value.
Cents	794,847	$7,948.47
Whole amount coined	1,579,566	$1,037,666 47

The bales of cotton taken for consumption are reported in the annual returns of the New York Shipping List, as follow. These we have converted into yards, and averaged them on the population:

Years.	Cotton Consumed.	Equal to Yards.	United States Population.	Yards per head.	Increase per cent.
1830, bales	126,512	151,814,400	12,966,020	11½	....
1840 "	295,193	354,221,600	17,067,453	21	9½
1850 "	595,269	684,322,800	21,000,000	32½	11½

Three times the cotton cloth, per head, is made now, in the United States, that was produced 20 years since, and the production has been very steady in its increase. It was 9½ yards per head in the 10 years ending with 1840, and 11½ yards in the last 10 years, assuming the current estimate for the population. Now, the consumption of cotton by the people of Great Britain, as given in Du Fay's circular, was 136,420,765 lbs. in 1849, which averages 4½ lbs. per head. The consumption, in the United States, is 11 lbs. per head. Thus, in the United States, the inhabitants consume, per head, nearly three times as much as the inhabitants of Great Britain. We may now make another comparison, which is this, viz. to take a year when Great Britain consumed as much cotton as the United States took in 1850, and compare the exports:

	GREAT BRITAIN.		UNITED STATES.	
	Cotton Consumed. Pounds.	Value of Cotton Exports.	Cotton Consumed. Pounds.	Value of Cotton Exports.
1827	249,804,396	$85,000,000	59,806,400	$1,259,457
1849	626,710,160	130,000,000	238,107,600	4,734,424

Now, then, two important truths are manifest here; namely, in 1827, the United States consumed a quarter as much cotton as Great Britain. In 1849, we consumed three-eighths as much; thus, we have gained 50 per cent. upon England. Again, we manufactured, last year, as much as did England in 1827, but we exported only $4,734,424, or $80,000,000 worth per annum less. England sold all she made; the United States consume all they make: deducting the cost of material, which, in 1827, was 7*d.*, or, in the aggregate, $35,000,000, she sold $50,000,000 of her labor for articles other than cotton. Her cotton, last year, cost $60,000,000, and she sold $70,000,000 of her labor. Now, if the people of the United States, instead of consuming two yards each more than the English consume, should

sell that for other things, our external cotton trade would be as large as that of England was in 1827; but our manufacturers have exclusively a home trade—what the English manufacturers never have had. The larger consumption of cotton in the United States keeps the prices higher, and, by so doing, absorbs all the home make, and the quantities imported also. This home market has been overdone. It is glutted, and the prices were naturally depressed. The annual returns of the Secretary contain the values of dry goods imported. These, as compared with previous years, are as follow:—

Imports of Dry Goods into the United States.—Fiscal Years.

	1848.	1849.	1850.
Woollens.			
Cloths and Cassimeres	$6,346,145	$4,995,957	$6,184,190
Merino Shawls	1,357,129	1,196,376	934,348
Blankets	1,146,587	1,161,429	1,244,375
Worsted stuffs	3,858,416	4,070,185	5,004,250
Hosiery	731,089	718,794	718,135
Other Woollens	1,140,410	1,068,807	1,880,526
Total Wool	$14,597,696	$13,211,548	$15,965,824
Cottons.			
Prints and Colored	$12,490,501	$10,286,894	$13,640,291
White	2,487,256	1,438,635	1,773,302
Tamboured	495,576	702,631	1,267,286
Hosiery	1,383,871	1,315,783	1,558,173
Yarn and Thread	727,422	770,509	799,156
Other Cotton	836,963	1,240,389	858,422
Total Cotton	$18,421,589	$15,754,841	$19,896,630
Silks.			
Piece Goods	$10,762,801	$7,588,822	$14,450,560
Hosiery	427,703	468,393	616,217
Tamboured	1,026,235	1,045,216	1,131,462
Other Silk	2,671,868	4,873,336	872,380
Silk and Worsted	2,456,652	2,452,289	1,653,809
Total Silk	$17,345,259	$16,428,056	$18,724,428
Linen	$6,012,197	$5,156,924	$7,063,184
Other Flax	611,451	750,318	1,031,638
Grand total	$56,988,192	$51,501,667	$62,681,704

The classification is not so extended as would have been desirable, but the general heads indicate the nature of the transactions. The aggregate increase is, as compared with 1848, $5,836,781, of which each description partakes in nearly equal proportions. The increase in silk piece-goods seems to have been greater than any other single article, but some different classification has, no doubt, varied the figures. It would seem to be the case, that the quantities of dry goods increase far less than the internal increase of trade.

BALTIMORE.—ARRIVALS IN 1850.

The annexed table presents a complete view of the foreign commerce of the port of Baltimore, during the year 1850. It comprises monthly statements of the arrivals, clearances, aggregate tonnage, and value of cargoes.

	Foreign Arrivals.	Foreign Clearances.
Ships	60	95
Barques	85	91
Brigs	208	206
Schooners	105	119
Total	467	511

The vessels cleared during the year were destined to the following countries, viz. to England and Ireland, 33; Holland, 18; Bremen, 29; France, 6; Peru, 4; Mexico, 3; Russia, 2; Africa, 4; Spain, 4; Brazil, 45; Venezuela, 5; New Grenada, 3; Spanish Main, 4; Buenos Ayres, 2; Austria, 1; Portugal, 1; Quebec, 1; Chili, 2; to the various West India Islands and British Provinces, 269; and to California, 51.

	Aggregate Tonnage.	No. of Men employed
January	11,962	459
February	10,943	442
March	9,827	417
April	10,162	449
May	12,540	511
June	13,727	447
July	12,065	490
August	12,053	470
September	7,658	333
October	11,527	482
November	7,885	222
December	10,238	480
Total	130,587	5,202

FOREIGN EXPORTS.

	Total Value of Foreign Exports.	Value of Exports to California.
January	$677,319.00	$250,000.00
February	707,402.71	234,962.00
March	752,656.23	226,002.65
April	665,532.23	128,171.29
May	653,989.05	86,950.93
June	743,681.74	75,193.10
July	617,691.59	105,724.72
August	601,240.25	36,964.24
September	588,849.94	134,504.55
October	765,697.93	256,309.80
November	776,497.21	262,987.69
December	647,840.57	230,215.54
Total	$8,278,418.45	$2,027,986.54

The receipts from "duties" at the custom-house, from the 1st January to 31st December, 1850, amounted to $1,008,633.23, being larger than for any previous year. The total receipts into the depository at Baltimore, during the year, were $1,026,340.97, and the disbursements, during the same period, $1,029,965.51; the latter exceeding the former by $3,624.54, and leaving on hand, 1st inst., $16,681.70, against a balance, 1st January, 1850, of $20,286.24.

It is impossible to ascertain the precise value of the imports during the year, for the reason that a large portion of them are non-duty-paying articles. In this latter class, we note nearly 200,000 bags coffee.

The value of merchandise exported, during the year 1850, to foreign countries, including California, was $8,278,418.45. Of this amount, exports to the value of $2,027,986.54 were sent to California.

Vessels built in 1850.

	No.	Tons.
Ships	9	5,641.05
Barques	5	1,465.17
Brigs	2	340.78
Steamboats	2	231.16
Schooners	39	3,497.91
Total	57	11,176.17

IMPORTATIONS.

Coffee.

The imports during 1850 and 1849 were—

	1850.	1849.
	Bags.	Bags.
From Rio Janeiro	149,345	166,386
" Laguayra	24,129	23,646
" Porto Rico	5,358	1,741
" Maracaibo	2,754	——
" Jamaica	1,448	268
" Cuba	927	——
" St. Domingo	407	1,413
" Rotterdam	447	——
" Guayaquil	91	——
Total	184,906	193,454

Cotton.

The receipts during the year 1850 were—

From Charleston	5,838 bales.
" New Orleans	3,549 "
" Savannah	2,130 "
" Mobile	1,477 "
" Apalachicola	1,290 "
Total	14,084 "

Cattle and Hogs.

The number of beef cattle weighed at the State live-stock scales, from the

1st November, 1848, to 1st November, 1849, was 26,807 cattle, weighing 26,650,174 lbs.

The number from 1st November, 1849, to 1st November, 1850, was 31,437 cattle, weighing 29,144,095 lbs.

The number of hogs from November, 1848, to November, 1849, was 135,375, weighing 27,057,644 lbs.

The number from November, 1849, to November, 1850, was 98,753, weighing 20,174,872 lbs.

Grain.

The imports in 1850, were—

Wheat	2,275,000	bush.
Corn	3,250,000	"
Oats	600,000	"
Rye	140,000	"
Peas	30,000	"
Beans	4,000	"
Total	6,299,000	"

Hides.

The number imported during 1850, was:—

From Buenos Ayres	76,694
" Rio Grande	64,731
" Rio de Janeiro	32,551
" Laguayra	14,887
" West Indies	6,634
" Maracaibo	4,554
" Pacific	3,393
" Coastwise	30,727
Total, 1850	234,171
Total, 1849	227,589

Molasses.

The import in 1850 was—

Barrels and Casks	12,984
Hogsheads and Tierces	9,017

Rice.

The receipts during 1850 were—

Tierces and Casks	3,277
Barrels	514

Sugar.

The import in 1850 was—

Hogsheads	18,537	Boxes	3,057
Barrels	6,649	Bags	11,203

Imports of Sugar and Molasses from New Orleans, for Three Years, the Year commencing 1st November.

	SUGAR.		MOLASSES.		
	Hhds.	Bbls.	Hhds.	Tcs.	Bbls.
1848	10,279	3,269	721	554	12,703
1849	9,851	2,384	.....	251	11,066
1850	8,962	2,661	77	244	14,715

Imports from West Indies, the Year ending 31st December.

	SUGAR.		MOLASSES.		
	Hhds.	Bbls.	Hhds.	Tcs.	Bbls.
1848	14,841	2,393	6,608	852	247
1849	12,590	5,654	5,883	499	112
1850	11,454	1,426	6,815	527	294

INSPECTIONS.

Salted Fish.

The following is the amount of salted fish inspected during 1850:—

	No. 1.	No. 2.	No. 3.	Condemned.	Total.
Mackerel, barrels	1,343	1,257	20,948	1,021	24,569
Mackerel, half barrels	670	954	1,533	206	3,363
Shad, barrels	6,820	249	.....	194	7,263
Shad, half barrels	747	161	.....	18	926
Herrings, barrels	27,263	396	.....	1,903	29,262
Herrings, half barrels	875	.....	.....	43	918
Salmon, barrels	24	.....	.....	.....	24
Salmon, half barrels	5	.....	.....	.....	5
Codfish, barrels	165	.....	.....	.....	165
Codfish, half barrels	32	.....	.....	22	54
Bluefish, barrels	15	.....	.....	.....	15

Flour and Meal.

Inspections of flour, corn meal, and rye flour, for the last 10 years:—

	FLOUR.	CORN MEAL.			RYE FLOUR.
	Bbls.	Hhds.	Bbls.	Hf. Bbls.	Bbls.
1841	628,974	459	10,736	34	3,842
1842	558,282	715	7,772	437	5,453
1843	560,431	535	13,359	821	8,424
1844	499,501	245	25,054	1,525	9,904
1845	576,745	631	23,949	1,450	6,530
1846	850,116	1,076	40,942	1,744	5,402
1847	959,456	934	105,842	1,298	6,690
1848	736,441	333	60,225	1,322	7,573
1849	764,519	428	51,772	2,051	8,011
1850	896,592	272	42,403	3,369	5,430

Tobacco.—Inspections, &c. in 1850.

The stock on hand, in 5 warehouses, 1st January, 1850, was	19,628 hhds.
Amount inspected in 1850	41,833 "
Total	61,461 "
Exported and consumed in 1850	50,844 "
Leaving on hand, 31st December, 1850	10,617 "

The kinds inspected were as follow:—

Maryland	27,085 hhds.
Ohio	13,965 "
Kentucky	756 "
Virginia	15 "
Pennsylvania	12 "
Total	41,833 "

From the above it will be seen that the stock, 1st January, 1850, was 10,617 hhds; same period of 1850, 19,628 hhds.; and of 1849, 32,690 hhds.

The stock on hand on the 1st January, for 20 years past, has averaged	13,927 hhds.
For 10 years past	17,881 "
For 5 years past	25,510 "

The crops to come to market in the year 1851, are estimated as follows:—

Virginia, about	30,000 hhds.
Kentucky, Tennessee, and Missouri, about	50,000 "
Maryland, about	22,000 "
Ohio, about	14,000 "

Whiskey.

The amount inspected during 1850, was 1,067 hhds. and 31,323 bbls., of which 665 hhds. and 7,837 bbls. were received by the Tidewater Canal, and 928 bbls. from New Orleans.—*Baltimore American.*

Table of Tobacco Inspections for the last 10 *Years.*

	Maryland.	Ohio.	Virginia, and other kinds.	Total.
1850	27,084	13,965	783	41,833
1849	30,689	13,664	1,248	45,601
1848	23,491	9,702	703	33,906
1847	34,580	15,219	772	50,571
1846	41,416	29,626	754	71,896
1845	39,538	26,696	1,755	67,989
1844	32,249	15,464	1,244	48,957
1843	29,354	13,465	4,877	47,696
1842	33,759	11,278	1,439	46,476
1841	29,980	7,692	1,479	39,151

Exports of Tobacco from the Port of Baltimore, for the last 10 *Years.*

	Bremen.	Rotterdam.	Amsterdam.	France.	All other Places.	Total.
1850	15,864	7,814	5,973	8,177	6,540	44,368
1849	18,821	13,783	8,725	9,562	1,033	51,924
1848	12,787	7,910	3,103	4,959	131	38,890
1847	22,967	7,819	11,838	9,413	1,895	33,482
1846	24,404	9,498	6,181	6,371	3,037	49,491
1845	26,832	18,171	10,944	7,183	2,880	66,010
1844	17,139	11,864	7,095	7,212	1,594	44,904
1843	16,990	6,525	7,325	7,932	3,822	42,594
1842	17,719	10,874	8,109	4,682	2,379	43,763
1841	16,373	7,918	5,169	6,022	2,519	38,001

Exports of Flour from Baltimore, for 1850.

	American Vessels.	Foreign Vessels.
	Bbls.	Bbls.
Swedish West Indies	925	.....
Danish West Indies	15,317	2,574
Holland	150	504
Hanse Towns	2	1,493
England	45,706	4,570
British Guiana	12,937	5,313
British West Indies	62,783	25,914
British N. A. Colonies	9,785	9,317
Cuba	162	.....
Porto Rico	1,354	.....
Hayti	1,540	.....
New Grenada	1,025	325
Venezuela	10,466	.....
Brazil	97,892	.....
Montevideo	1,521	.....
Buenos Ayres	450	2,356
Chili	400	.....
Bolivia	40	125
Liberia	403	.....
Yucatan	1,000	.....
Madeira	.....	550
Mexico	450	.....
	264,308	53,091
	53,091	
Total	317,399	

[*Price Current.*

STATE OF NEW YORK.

Onondaga Salt.

The whole number of bushels of salt manufactured and inspected on the Onondaga Salt Spring Reservation, during the year ending December 31, 1850, is as follows:—

Syracuse, 1st Ward	2,175,711	bushels.
2d Ward	1,184,928	"
Liverpool	648,832	"
Geddes	259,448	"
Aggregate number of bushels	4,268,919	"
Amount manufactured and inspected in 1849	5,083,360	"
Diminution in 1850, from 1849	814,450	"

[*Albany Evening Journal.*

COMMERCE OF PORTLAND, MAINE.

Receipts of Flour and Corn.

	Flour.	Corn.
1848.	Bbls.	Bushels.
From New York	94,423	59,705
" Boston	16,969	20,040
" Southern Ports	8,908	152,378
Total	119,400	232,123
1849.		
From New York	114,388	36,047
" Boston	21,412	22,803
" Southern Ports	18,014	135,417
Total	153,814	194,267
1850.		
From New York	138,993	81,420
" Boston	4,288	10,062
" Southern Ports	138,998	131,159
Total	169,879	222,641

Above are the receipts of flour and corn at this place for the past three years, made as correct as circumstances will permit, but presumed to be rather less than more in quantity.—*Argus.*

Imports of Molasses and Sugar.

The following is the amount of molasses imported into this port:—

	Hhds.	Tcs.	Bbls.	Gallons.
In 1850	34,997	1,579	774	3,824,143
In 1849				2,864,511
Excess in 1850				959,632

Sugar, in 1850	1,039,759
" 1849	27,130
Excess in 1850	1,012,629

Arrivals and Clearances—Coastwise.

The number of arrivals, coastwise, at this port, for the quarter ending December 31st, 1850, is 53; tonnage, 8691$\frac{32}{95}$; men employed, 337.

The number of clearances, coastwise, during the same time, is 86; tonnage, 18,518$\frac{77}{95}$; men employed, 598; boys, 10.—*Advertiser.*

RESOURCES OF OHIO.

In a late number of the Cincinnati Gazette, we find some statistical information in regard to the resources of Ohio, from which we glean a few items:—

It is well known, that two or three counties in this State have produced upwards of a million of bushels each of wheat, and that others, not deemed first-rate wheat counties, have produced half a million each. Now there are in Ohio 87 counties, and we shall be within bounds to say they have produced thirty millions of bushels in 1850. This crop does not appear in the census returns, but it is nevertheless a reality. Now there are, in round numbers, two millions of people; and six bushels each is an abundant allowance for consumption. We have, then, this result:—

Wheat crop of 1850	30,000,000 bush.
" " consumed	12,000,000 "
Surplus for export	18,000,000 "

At 75 cents per bushel, the surplus is worth $13,500,000.

This is the money value; but look at it in another view, as a food-supplying State, for people who cannot supply themselves. Then the problem runs thus:—

30,000,000 bushels feed	5,000,000 people.
12,000,000 " "	2,000,000 at home.
18,000,000 surplus, feed	3,000,000 abroad.

Thus, we find Ohio giving fine wheat flour to three millions of people out of her own domain!

No grain is as much the agricultural glory of our country as Indian corn. Its value as an article of commerce is hardly greater than its beauty as a plant. We are speaking of bread. We happen to have the return of Indian corn (in 1850) for two counties—one (Pickaway) a first-class county for corn, and the other (Greene) only a second-class one. The comparison of these, with the return of the same counties in 1840, may serve to give an idea of progress in corn.

	1840.	1850.	
Pickaway county	1,323,809	3,323,000	bush.
Greene county	659,296	1,161,082	"
Total	1,963,180	4,484,082	"
Increase		125 per cent.	
Amount for each person		100 bushels.	

This increase and result seem almost incredible, and yet there can be no doubt of its truth. Let us suppose, however, that the increase for the entire State is but three-fourths the increase for these counties, viz. 93 per cent., and look at the result. In 1840, the States producing the most Indian corn, in order, were—Tennessee, 44,986,184; Kentucky, 39,847,120; and Ohio, 33,668,144. If Ohio, as the returns indicate, has increased the corn production 90 per cent., then the crop of 1850 is sixty-four millions of bushels.

Looking to the consumption of this vast crop, the surplus is chiefly used in fattening cattle and hogs for exportation, and no export of corn and meal. Both these we know very nearly, and the result is:—

Corn crop	64,000,000 bush.
Consumed for stock	42,000,000 "
Exported in fat animals	20,000,000 "
Exported in bulk	2,000,000 "

The last two items give an exported surplus of twenty-two millions of bushels. If we add to the value of this corn the labour of packing, cooperage, commissions, &c., on the export of animal products, we have at least ten millions of dollars for this surplus. Thus, we find, that the surplus food of Ohio, in two leading articles, will come to twenty-five millions of dollars—and, in raw material, is enough to feed another population equal to her own.

PORK TRADE OF THE WEST.

We give below returns from the West, as far as received, including those previously published—keeping each State separate. In giving the number packed at Terre Haute this season, in our last number, we understated it by 10,000 head. This error we correct below.

	1851.	1850.
Ohio.		
Previously reported, exclusive of Cincinnati	64,027	152,990
Cincinnati	324,529	401,755
Total	388,556	558,745
Indiana.		
Previously reported, exclusive of Terre Haute	274,549	320,175
Terre Haute	65,548	60,000
Fort Wayne	2,000	none.
Huntington	500	900
Lagro	1,500	2,000
Wabashtown	1,000	4,500
Americus	700	900
Durkee's Ferry	5,000	4,500
Darwin	1,200	3,300
York	1,500	1,000
Frankfort	2,500	1,900
Armiesburgh	2,000	3,500
Carlisle	2,500	.....
Evansville	12,000	14,000
Total	372,497	416,675
Illinois River.		
Beardstown	35,000	37,000
Alton	25,000	40,000
Meradocia	9,000	9,000
Maples	4,000	6,500
Peoria	30,000	21,000
Pekin	19,000	28,000
Canton	12,000	24,000
Liverpool	2,400	400
Springfield	8,000	19,500
Chillicothe	4,000	3,800
Lacon	13,000	11,600
Peru	4,000	15,000
Total	165,400	215,800

Mississippi River.	1851.	1850.
St. Louis, about	85,000	124,000
Hannibal	17,000	24,000
Quincy	20,000	29,000
Keokuk	22,000	19,000
Burlington	19,000	29,000
Total	161,000	225,000

Recapitulation.

	1850–51.	1849–50.
Ohio	388,556	553,745
Indiana	372,497	416,675
Illinois	165,400	215,800
Mississippi	161,000	225,000
Cumberland Valley	30,000	40,000
Kentucky	205,414	201,000
Total	1,322,867	1,652,220
		1,322,867
Deficiency in number		329,352

There are yet a great many points in Missouri, Illinois, and Iowa, to hear from.—*Cincinnati Price Current, Jan.* 29, 1851.

ANALYSIS OF THE ASHES OF THE HOP.*

The 2 lbs. of hops, when dried at a steam-heat, lost 3 oz. of moisture, and left 1 lb. 13 oz. of dry hops. The dry hops were burned to ashes in a large earthen crucible, and furnished 1282 grs. of ashes, being at the rate of $\frac{9}{10}$ per cent.

These ashes were analyzed in the usual manner, and every hundred parts contained as follows:—

1. *Ashes of the Hop.*

Silica (or pure sand)	20.95
Chloride of Sodium (common salt)	7.05
Chloride of potassium	1.63
Potash	24.50
Lime	15.56
Magnesia	5.63
Sulphuric acid (oil of vitriol)	5.27
Phosphoric acid	9.54
Phosphate of iron	7.26
Carbonic acid	2.61
	100.00

2. *Analysis of the Ashes of the Leaves of the Hop Plant.*

The $9\frac{3}{8}$ oz. of leaves, dried at a steam-heat, lost $1\frac{1}{8}$ oz. of moisture, and left $8\frac{1}{4}$ oz. of dried leaves. The dried leaves, burned to ashes as before, gave 572 grs., being at the rate of $16\frac{1}{3}$ per cent.

The ashes were of the following composition in the hundred parts:—

* In the following tables, the loss is previously deducted.

Ashes of the Leaves of the Hop Plant.

Silica	10.14
Chloride of sodium, (common salt)	7.92
Soda	0.32
Potash	12.48
Lime	41.46
Magnesia	1.99
Sulphuric acid	4.20
Phosphoric acid	2.02
Phosphate of iron	2.93
Carbonic acid	16.54
	100.00

3. *Analysis of the Ashes of the Hop Bind or Stalk.*—The 1 lb. $2\frac{1}{2}$ oz. of the bind, dried at a steam-heat, lost $1\frac{7}{8}$ oz. of moisture, and left 1 lb. .$0\frac{5}{8}$ of dry bind. The dry bind, burned, gave 353 grs. of ashes, being at the rate of nearly 5 per cent.

The ashes gave the following results in the 100 parts :—

Ashes of the Bind of the Hop.

Silica	4.64
Chloride of sodium, (common salt)	4.95
Chloride of potassium	7.38
Potash	18.62
Lime	29.59
Magnesia	3.15
Sulphuric acid	2.63
Phosphoric acid	5.22
Phosphate of iron	0.31
Carbonic acid	23.51
	100.00

4. *Composition and percentage of the Ashes separated from the Carbonic Acid.*—The carbonic acid, combined with the lime, &c. in the ashes, was produced, during the burning of the plant, by the oxidation of the carbon of the vegetable matter. It is, therefore, not a mineral ingredient of the soil; and, in order to arrive at the real percentage of inorganic matter, it is necessary to withdraw the carbonic acid from the foregoing tables.

This has been done in the following tables :—

TABLE 1.—*Quantity per cent. of Mineral Ingredients in the Hop, Leaves of Hop, and Bind, dried at the temperature of Boiling Water.*

	Hop.	Leaves.	Bind.
Percentage	9.87	13.6	3.74

TABLE 2.—*Composition in* 100 *parts of the Inorganic Matter.*

	Hop.	Leaves.	Bind.
Silica	21.50	12.14	6.07
Chloride of sodium, (common salt)	7.24	9.49	6.47
Chloride of potassium	1.67	.....	9.64
Soda	.....	0.39	.....
Potash	25.18	14.95	24.35
Lime	15.98	49.67	38.73
Magnesia	5.77	2.39	4.10
Sulphuric acid	5.41	5.04	3.44
Phosphoric acid	9.80	2.42	6.80
Phosphate of iron	7.45	3.51	0.40
	100.00	100.00	100.00

5. *Quantity of Inorganic Matter taken from the Land by 4 hills of Farnham Hops.*—In order to obtain practical benefit from the foregoing analysis, it will be necessary, in the next place, to ascertain the whole amount of inorganic matter removed by the 4 hills of hops; and, likewise, the amounts of the separate ingredients.

The following table gives us the actual weight, in grains troy, of the various ingredients removed from the soil by 4 hills of hops:—

Actual Weight of Mineral Ingredients removed from the Soil by 4 hills of Hops.

	Hops.	Leaves.	Bind.
Silica	268.11	54.24	16.63
Chloride of sodium	90.28	46.31	17.73
Chloride of potassium	20.82	.....	26.41
Soda	.....	1.90	.....
Potash	314.00	72.96	66.72
Lime	199.27	242.39	106.12
Magnesia	71.95	11.66	11.23
Sulphuric acid	67.46	24.60	9.43
Phosphoric acid	122.121	11.81	18.63
Phosphate of iron	92.90	17.13	1.10
Total weight	1247.00	488.00	274.00

6. *Amount of Mineral Ingredients removed from the Soil by an Acre of Hops.*—The number of hills of hops to an acre varies in different localities. In some places 1000, in others 1260, in others 1440 hills go to the acre.

In the present instance, I believe about 1000 to be the number of hills contained in an acre.

Therefore, by multiplying the numbers in the preceding table by 250, we shall have the actual weight of the various inorganic ingredients of the soil removed from an acre of land by the hop.

For the convenience of agriculturists, I give, in the following table, these weights in pounds and ounces avoirdupois:—

Amount of various Mineral Ingredients removed from an Acre of Land by the Farnham Hop.

	500 lbs. of Hops.	146½ lbs. of Leaves.	239 lbs. of Bind.	Total in Hops, Leaves, & Bind.
	lb. oz.	lb. oz.	lb. oz.	lb. oz.
Silica	9 9	2 2	0 9½	12 4½
Chloride of sodium	3 3½	1 10	0 10	5 7½
Chloride of potassium	0 12	0 0	0 15	1 11
Soda	0 0	0 1	0 0	0 1
Potash	11 3½	2 10	2 6	16 3½
Lime	7 1¼	8 10	3 13	19 8¼
Magnesia	2 9	0 6	0 6½	3 5½
Sulphuric acid	2 6¾	0 14	0 5¼	3 10
Phosphoric acid	4 6	0 7	0 9½	5 6½
Phosphate of iron	3 5	0 10	0 0¾	3 15¾
Sum total	44 8	17 6	9 11½	71 9½

TRADE OF ST. LOUIS.

The St. Louis Republican of the 1st January contains an elaborate statement of the trade of that city for the year 1850, from which we make the following extracts:

Tobacco.

The article is classed among the most important agricultural productions of our State, and, since 1838, has attracted considerable attention for export. While the receipts for 1850 fall short 609 hhds., compared with the receipts for the previous year, they still slightly exceed the receipts of 1848.

Total receipts in 1850	9,055
Receipts of 1849	9,664
Decrease in 1850	609

	Prices in 1849.*		Prices in 1850.*
March	$1.50 to $7.00	March	$3.00 to $12.00
April	1.50 to 7.50	April	4.45 to 7.75
May	1.20 to 8.00	May	3.00 to 12.00
June	2.50 to 9.00	June	4.15 to 13.20
July	2.50 to 9.50	July	4.45 to 8.45
August	2.50 to 8.00	August	5.50 to 10.50
September	1.50 to 7.00	September	5.00 to 13.50
October	1.25 to 6.50	October	5.45 to 9.35
November	1.25 to 6.50	November	6.00 to 15.00
December	1.25 to 6.50	December	4.75 to 8.30

* January and February, no sales.

Hemp.

Receipts of hemp during the past year greatly exceed those of any year since 1847, when they reached over 72,222 bales; a circumstance, however, measurably owing to the non-reception during the preceding year of the crop due, the receipts of 1846 having been less than 34,000 bales. The market throughout 1849 was marked by more firmness than during the past year, and the rates were higher, having ranged between $1.20 and $1.26, varying a little from January to December. At the close of 1849, the stock in store was 893 bales. The stock in store and on sale at the close of 1850 is about 2,000 bales. The market during January was inactive at the figures of the previous year, and declined in February to $90 to $105 per ton. The ruling rates for the balance of the year were $80 to $95.

Total	60,862
Receipts of 1849	46,290
Increase of 1850 over 1849	14,572

Lead.

The production of this article has been gradually declining since 1845; receipts, per rivers, since that time, having fallen off from 750,877 pigs to

873,502. In the mean time, the demand for home consumption has materially increased, and very little has been exported. In consequence of this decline in production, prices have gone up, and, during the last two years, have ranged much higher than for many years previous. For the greater part of the past year, the price of upper-mines lead has been over $4.25, and the market closes firm at $4.37½ to $4.40 per 100 pounds.

Monthly Receipts per Rivers, Upper and Lower Mines inclusive.

	Pigs.		Pigs.
January	3,421	July	57,660
February	3,542	August	38,466
March	43,340	September	56,263
April	75,264	October	56,563
May	88,626	November	64,684
June	84,594	December	1,079

Total	573,592
Received, per rivers, in 1849	590,293
Falling off of 1850 from 1849	16,701

Actual Product of Upper Mines, for the last two Years.

In 1850	567,946	pigs, or	37,589,728	pounds.
In 1849	625,463	"	42,531,634	"
Decrease	57,967	"	4,941,906	"

Actual Product of Lower Mines for 1850.

Richmond mines	11,872	pigs, or	832,430	pounds.
Other mines	74,104	"	5,167,570	"
	85,976		6,000,000	"

Monthly Prices during 1850.

January	$3.92 @	3.95
February	3.95	4.00
March	4.37½	4.50
April	4.70	4.75
May	4.58	4.60
June	4.25	4.35
July	4.15	4.20
August	4.10	4.15
September	4.15	4.10
October	4.25	4.30
November	4.25	4.30
December	4.35	4.40

Monthly Prices during 1849.

January	$3.75 @	3.80
February	3.80	3.85
March	4.00	4.10
April	3.80	3.85
May	3.95	4.00
June	4.00	4.05
July	4.05	4.10
August	4.20	4.25
September	4.20	4.25
October	4.05	4.10
November	3.90	3.92
December	3.92½	3.95

Wheat.

Receipts of this article, during the year just closed, have slightly exceeded those of last year, but fall short of those of 1846, 1847, and 1848. The last year has, doubtless, been a better wheat year than 1849, but owing to a generally entertained opinion that the article must advance, farmers and shippers held back, until threatened by closing navigation. This will account for the heavy receipts during November, compared with other months in the year.

Monthly Receipts per Rivers.

	Sacks.	Barrels.		Sacks.	Barrels.
January	10,013	123	July	29,144	237
February	14,941	88	August	70,651	284
March	60,659	1,452	September	118,378	1,384
April	83,135	1,036	October	132,177	2,662
May	60,180	227	November	208,139	4,605
June	43,971	144	December	45,365	483
Total				876,753	12,856

Receipts per rivers, in 1850 ..... 1,792,074 bushels.
Receipts per rivers, in 1849 ..... 1,762,535 "

Increase of 1850 over 1849 ..... 29,539 "

Monthly Prices, per Bushel, for 1849.

January	80 @	85 cts.	July	85 @	97½ cts
February	80	85	August	85	87½
March	76	80	September	85	90
April	75	78	October	90	93
May	83	85	November	93	95
June	83	85	December	98	115

Flour.

Receipts by rivers, in 1850 282,718
Received by rivers, in 1849 301,933

Decrease 9.215

Receipts per Wagons, during 1850.

From Centre Mills, (new,) Illinois, since 30th September 1,833
" Hope Mills " 1st January 1,435
" Planet Mills " 1st January 1,735
" Harmony Mills " 1st January 2,405
" Harrison's Mills " and other sources 24,944

Total 32,352
Add receipts per rivers 292,718

Total of all receipts for 1850 325,070

Monthly Prices during 1850.

January	$4.75 @	5.12½
February	4.20	5.25
March	5.37½	5.50
April	5.00	5.37½
May	5.62½	6.00
June	6.00	6.35
July	4.25	5.25
August	3.75	4.00
September	4.30	4.45
October	4.50	4.60
November	4.50	4.75
December	5.75	5.12½

Monthly Prices during 1849.

January	$4.20 @	4.25
February	4.25	4.50
March	4.20	4.25
April	3.70	3.75
May	3.75	3.80
June	3.80	3.87½
July	4.10	4.25
August	4.25	4.30
September	4.30	4.45
October	4.50	4.60
November	4.50	4.75
December	4.75	5.12½

Corn.

While the receipts of corn for the last year have almost quadrupled those of the year preceding, the ruling rates have almost doubled those of that

year. The demand has been active throughout, and the remaining stock on sale at the close is by no means large.

Total receipts by river, 1850	484,014
Receipts of 1849	142,182
Increase of 1850 over 1849	341,832

Monthly Prices during 1850.			*Monthly Prices during* 1849.		
January	38 @	40 cts.	January	30 @	32 cts
February	37	40	February	30	32
March	45	48	March	25	27
April	44	45	April	23	24
May	56	60	May	26	28
June	60	62½	June	36	38
July	58	64	July	36	38
August	58	61	August	36	39
September	50	52	September	35	38
October	52	55	October	36	39
November	46	48	November	35	38
December	50	55	December	38	40

Castor Beans.

Under light receipts, prices have been highly remunerative. The season opened at the high price of $2.20, but in April prices ranged to $2.60 to $2.65 per bushel. From this, the article gradually declined to the close of the year, and we now quote at $1.25, and few arriving.

January	$2.20 @	2.37½	July	$1.70 @	1.75
February	2.26	2.50	August	1.60	1.70
March	2.50	2.60	September	1.45	1.50
April	2.60	2.65	October	1.35	1.40
May	2.55	2.60	November	1.25	1.30
June	1.75	1.80	December	1.30	1.35

Flaxseed.

The demand has been active throughout the year, and prices have been proportionably high. The following have been the monthly rates, per bushel:—

January	$1.45 @	1.50	July	$1.30 @	1.35
February	1.40	1.50	August	1.25	1.30
March	1.50	1.55	September	1.10	1.20
April	1.55	1.60	October	1.25	1.30
May	1.50	1.55	November	1.45	1.50
June	1.30	1.35	December	1.60	1.65

Pork.

The receipts of the last year vary but little from those of 1849; but our monthly table will show that the bulk of the sum total was the product of 1849, very little having been received since the present packing-season commenced. The high price of corn induced growers to send forward that staple, rather than to apply it to fattening, and hence few hogs have been prepared for slaughtering. Up to the present date of the last packing-season, the number of hogs slaughtered in this city alone was nearly 115,000; and at points above, and throughout the West, the number was also large. So far as we are informed, with regard to the present season, only 55,000 hogs have been killed in this city, and a corresponding falling off is observed throughout the country. This deficiency must advance the price of pork, but whether sufficient to remunerate dealers for the high prices

paid for hogs, is doubtful. The hog market opened timidly, at figures approximating to $3, but, since the commencement, has steadily advanced, until within a few days, since which it has been less firm; and few sales are now effected beyond $4, for hogs weighing 220 lbs., though drovers are contending for $4.15 to $4.20.

	Tcs.	Bbls.
Total receipts, 1850	1873	101,562
	1745	111,164

The following have been the monthly prices for mess pork, per bbl., during 1850, prime and clear mess having the usual average differences, below and above:—

January	$8.37½	@ 8.50	July	$10.00	@ 10.50
February	8.37½	8.50	August	10.50	11.00
March	8.25	8.37½	September	nominal.	
April	8.37½	8.50	October	"	
May	9.25	9.50	November	"	
June	10.60	11.00	December	10.25	@ 11.00

Lard.

Receipts of lard, for the last year, have about equalled those of the year previous. Prices have not materially varied from those of the previous year, and the market has been active.

Monthly Prices, per 100 *lbs., in* 1850.

January	$4.50	@ 5.50	July	$6.00	@ 7.00
February	4.50	5.50	August	6.25	6.75
March	5.25	6.50	September	5.50	6.12½
April	4.50	5.80	October	5.62½	6.25
May	4.75	6.00	November	6.00	7.00
June	6.35	6.75	December	6.00	7.00

Receipts at this port of the principal articles of Produce, for the last two years.

	1849.	1850.
Wheat, sacks	881,428	927,346
Flour, barrels (per rivers)	301,933	298,231
" " (per wagons)	.....	32,452
Corn, sacks	142,182	784,014
Oats, sacks	126,835	348,716
Barley, sacks	44,613	34,744
Pork, barrels	113,909	101,562
" tierces	.....	1,873
Salt, sacks	289,580	261,230
" barrels	22,557	19,158
Hemp, bales	45,227	60,862
Lead, pigs	591,851	573,502
Tobacco, hogsheads	9,664	9,055
Beef, barrels	14,837	6,049
" tierces	3,121	2,586
Dry Hides	68,395	94,228
Whisky, barrels	28,741	25,259
Sugar, hogsheads	23,814	25,796
" bins	3,000	5,034
" boxes	3,064	12,388
Coffee, sacks	58,702	73,678
Molasses, barrels	31,217	29,518
Lard, barrels	64,615	61,535

	1849.	1850.
Lard, tierces	11,041	17,925
" kegs	15,512	14,549
Bacon, tierces	2,195	7,087
" casks	21,764	23,248
" barrels	1,646	3,019
" boxes	2,263	1,330
" pieces	.....	46,978
" pounds	.....	32,496
" bagged hams	.....	2,593
Bulk Pork, casks	.....	1,096
" " boxes	.....	100
" " pieces	.....	301,381
" " pounds	12,889,360	1,841,747

Tonnage.

The number of steamboats arrived during the year was as follows:—

	1849.	1850.
From New Orleans	313	303
Ohio River	401	493
Illinois River	686	788
Upper Mississippi	806	635
Missouri River	355	390
Cairo	122	75
Other points	217	215
Total	2,900	2,599

It appears that 246 different boats arrived at the port during the year.

WHALE FISHERY.

ANNUAL REPORT.

Review of the Whale Fishery for 1850.

We present to our readers a full and reliable review of the whale fishery for the last year, as compared with previous years. By this, it will be seen at a glance, that the past has been a year of great prosperity in the trade. The number of ships returning with full cargoes has been large, while prices have risen to an unprecedented height. Nevertheless, the importation of oil in 1850 will be found to fall short of that of 1849 about 7000 bbls. sperm, and 48,000 bbls. whale, and the number of arrivals is less by 6 sperm and 19 right whalers, yet the stock on hand is about the same as on the 1st January, 1850. This discrepancy, as regards whale oil, is undoubtedly owing to a diminished consumption, arising from the very high figure at which oil has been held, which has forced many substitutes into the market, and seriously impaired exportations.

The number of vessels employed in the fishery is about the same as that of last year. Of the fleet, 145 have cruised in the Russian and Arctic

seas, during the last season, with great success; indeed, the average quantity of oil taken is larger than in any previous year.

We regret to say, that accounts from the sperm whalers in the Pacific are not at all encouraging. The old cruising grounds are pretty well exhausted for the present, and very light catchings are to be expected. If we are to judge by present indications, importations of sperm oil, for the coming year, will hardly exceed 75,000 bbls., while that of whale oil will not, probably, fall short of 275,000 bbls.

Perhaps no better evidence can be offered of the confidence felt by business men, than the fact that no less than 14 first-class vessels are in process of construction, or are under contract, all intended for the business, from this district alone, while 5 or 6 will be added to the New London fleet.

Importations of Sperm and Whale Oil, and Whalebone, into the United States, in 1850.

Ports.	Sperm.	Whale.	Bone.
	Bbls.	Bbls.	Lbs.
New Bedford	39,298	91,627	1,081,500
Fairhaven	8,812	10,559	477,900
Dartmouth	266	7	.....
Westport	3,607	324	.....
Mattapoisett	2,689	81	.....
Sippican	43	1,453	9,300
Wareham	250	2,719	38,100
Holmes's Hole	1,208	4,960	56,800
Edgartown	2,164	184	1,700
Nantucket	17,989	1,328	133,000
Yarmouth	68	13	.....
Provincetown	3,205	501	.....
Boston	3,845	786	3,700
Beverley	368	.....	.....
Truro	140	.....	.....
Warren	1,035	.....	.....
Providence	112	3,368	23,600
Stonington	900	15,226	179,600
Mystic	251	1,588	3,000
New London	2,349	36,545	203,000
Sag Harbor	718	26,478	193,100
Greenport	505	828	4,900
Cold Spring	776	763	.....
New York	2,054	1,310	460,000
Orleans	240	.....	.....
Total in 1850	92,892	200,608	289,200
1849	100,944	248,402	2,281,100
1848	107,976	280,656	2,003,000
1847	120,753	313,150	3,341,680
Average for 10 years	130,721	236,029	2,407,150

Exports of Whale Oil from New Bedford, in 1850.

To Hamburg	40,617 gallons.
Cowes, and a market	59,874 "

Exports from Boston, in 1850.

	Sperm, bbls.	Whale, bbls.	Bone, lbs.
To England	70,738	26,974	17,475
Scotland	1,600	.....	.....
Holland	.....	.....	15,000

Statement of the Average Prices of Sperm and Whale Oil, and Whalebone, for 4 Years.

	Sperm.	Whale.	Bone.
1850	120 7/10 cts.	49 1/10 cts.	34 4/10 cts.
1849	108 9/10	39 9/10	31 8/10
1848	100 1/2	36	30 2/8
1847	87 7/8	33 3/4	34

Number of Ships engaged in the North Pacific Fishery, for the 4 last Years, and the Average Quantity of Oil taken.

	Ships.	Average.	Total.
1847	177	1,059 bbls.	187,443
1848	159	1,164	185,256
1849	155	1,334	206,850

In 1850, the North Pacific fleet consisted of 145 ships, (as nearly as can now be ascertained,) 110 of which only have yet been heard from, having taken an average of 1748 bbls. this season.

Statement of Sperm Oil, Whale Oil, and Whalebone on hand in the United States, January 1, 1851.

	Sperm.	Whale.	Bone.
	Bbls.	Bbls.	Lbs.
New Bedford District	2,300	13,812	22,000
Nantucket	750	150	.....
Sag Harbor	.....	150	70,000
Provincetown	560	.....	.....
New York	.....	.....	150,000
January 1st, 1851	3,610	14,062	242,000
1850	3,760	13,000	440,000
1849	10,147	20,936	994,600
1848	5,606	29,126	921,500

Comparative Statement of Tonnage of Vessels employed in the Whale Fishery, 1st January.

	1850.	1851.		1850.	1851.
	Tons.	Tons.		Tons.	Tons.
New Bedford	76,858	81,442	Boston	.....	261
Fairhaven	14,735	14,430	Truro	.....	143
Westport	2,817	2,963	Orleans	.....	115
Dartmouth	111	111	Somerset	137	None.
Mattapoisett	1,760	1,822	Warren	4,487	4,669
Sippican	265	None.	Providence	842	865
Wareham	374	374	Fall River	646	646
Falmouth	1,106	1,106	Newport	1,382	1,543
Holmes's Hole	949	949	Stonington	5,877	5,391
Edgartown	1,860	1,860	Mystic	3,384	3,009
Nantucket	19,732	18,697	Greenport	3,059	2,985
Provincetown	1,232	3,095	New London	15,099	16,586
Quincy	100	None.	Sag Harbor	7,935	4,758
Beverly	162	326	Cold Spring	2,878	2,878
Lynn	720	720	New Suffolk	227	227
Yarmouth	90	None.	Total, 1st January	171,484	171,971

Recapitulative Table of Vessels employed in the Whale Fishery, Jan. 1, 1851.

Ports.	Ships and Barques.	Brigs.	Schooners.	Tons.
New Bedford	215	3	1	81,442
Fairhaven	45	.....	.....	14,430
Westport	11	5	.....	2,963
Dartmouth	.....	1	.....	111
Mattapoisett	7	2	.....	1,822
Wareham	1	.....	.....	374
Falmouth	3	.....	.....	1,106
Holmes's Hole	3	.....	.....	949
Edgartown	5	1	.....	1,860
Nantucket	53	1	1	18,697
Provincetown	2	6	19	3,095
Truro	.....	1	.....	143
Orleans	.....	.....	1	115
Boston	1	.....	.....	265
Lynn	2	.....	.....	720
Beverly	.....	2	.....	326
Warren	15	.....	.....	4,669
Providence	2	.....	.....	865
Fall River	2	.....	.....	646
Newport	4	.....	.....	1,543
Stonington	17	.....	.....	5,391
Mystic	9	.....	1	3,009
New-London	44	.....	4	16,586
Sag Harbor	14	1	.....	4,758
Greenport	9	1	.....	2,985
Cold Spring	7	.....	.....	2,878
New Suffolk	1	.....	.....	227
Total, Jan. 1, 1851	502	24	27	171,974
Same time, 1850	410	20	13	171,484

Showing a diminution in the number of ships of 8, and an addition of 4 brigs and 14 schooners during the year; also, an increase in the aggregate tonnage of 487 tons.

MISSOURI.

Imports into St. Louis for the Year 1850.

Apples, barrels	9,559
Bale Rope, coils	22,681
Bagging, pieces	1,266
Beans, (white,) barrels	1,035
" " sacks	744
" (castor,) sacks	2,974
Bran and Shorts, sacks	72,788
Beef, tierces	3,983
" barrels	8,047
Bacon, casks	20,497
" barrels and boxes	1,378
" pieces	20,567
Butter, barrels	1,489
" kegs, jars, &c	8,081
Beeswax, barrels	263
" packages	378
Barley, sacks	34,022
Corn, sacks	512,500
Rye, sacks	3,230
Coffee, sacks	74,636
Cheese, boxes	21,503
Dried Apples and Peaches, bbls	6,345
" " " sacks	15,429
Flour, barrels	322,403
Flaxseed, barrels	587
" sacks	2,867
Feathers, sacks	1,293
Hemp, bales	63,835
Hides, bales	73,832
Hay, bales	24,335
Iron, (pig,) tons	3,872
Lead, pigs	608,069
Lard, tierces	24,864
" barrels	62,226
" kegs	14,143
Molasses, barrels	31,140
Nails, kegs	88,361
Oats, sacks	315,595
Onions, barrels	351
" sacks	15,295

Oil, (lard,) barrels	132	Salt, (Liverpool,) sacks	158,686
" (castor,) barrels	386	" (Ti, &c.) bags	95,945
" (linseed,) barrels	1,189	" (Kenawha, &c.) barrels	23,974
Pork, barrels	132,827	Tobacco, hogsheads	9,259
" casks and tierces	23,041	" boxes	3,831
" boxes	6,612	Tallow, tierces	393
" pieces	648,622	" barrels	831
Potatoes, barrels	2,281	Wheat, barrels	12,843
" sacks	112,214	" sacks	920,243
Sugar, hogsheads	25,580	Wool, bales and sacks	1,170
" barrels and boxes	23,400	Whisky, barrels	30,109

[*St. Louis Price Current.*

NAVIGATION.

Statement, showing the number and class of Vessels built, and the Tonnage thereof, in each State and Territory of the United States, for the year ending June 30, 1849.

States and Territories.	Ships.	Brigs.	Schooners.	Sloops and Canal boats.	Steamers.	Total number Vessels built.	Tons. 95ths.
Maine	119	107	105	6	7	344	82,255.56
New Hampshire	8	.....	4	.....	.....	12	6,265.89
Vermont	.....	.....	.....	.....	.....	.....	.....
Massachusetts	38	7	65	9	1	115	23,888.48
Rhode Island	8	8	4	3	.....	18	2,760.28
Connecticut	2	1	38	14	1	56	5,066.26
New York	17	8	64	155	21	265	44,104.26
New Jersey	.....	1	57	27	2	87	8,025.55
Pennsylvania	3	2	27	102	63	197	24,207.73
Delaware	1	.....	16	5	.....	23	1,880.36
Maryland	9	9	129	.....	5	152	17,462.93
District of Columbia	.....	.....	.....	22	.....	22	609.20
Virginia	1	2	32	1	2	38	3,094.65
North Carolina	1	1	24	3	.....	29	3,032.27
South Carolina	.....	.....	6	.....	2	8	655.57
Georgia	.....	1	.....	.....	1	2	756.37
Florida	.....	.....	1	.....	.....	1	119.88
Alabama	.....	.....	2	1	.....	3	106.54
Mississippi	.....	.....	.....	.....	.....	.....	.....
Louisiana	.....	.....	1	4	4	21	1,755.48
Tennessee	.....	.....	.....	.....	2	2	242.79
Kentucky	.....	.....	.....	.....	34	34	8,423.33
Missouri	.....	.....	.....	8	11	19	2,886.51
Illinois	1	3	9	.....	.....	13	2,210.84
Ohio	.....	2	9	8	44	63	12,816.92
Michigan	.....	.....	15	2	8	25	5,148.66
Texas	.....	.....	.....	.....	.....	.....	.....
Oregon	.....	.....	.....	.....	.....	.....	.....
Total	198	148	623	370	208	1547	256,577.47

It is seen that, in point of amount of tonnage, Maine is highest; New York, second; Pennsylvania, third; Massachusetts, fourth; Maryland, fifth; Ohio, sixth; Kentucky, seventh; New Jersey, eighth.

Of the inland States, Ohio has built the largest amount.

The amount built in the several States was as follows:—

	Tons.
Ohio	12,816
Kentucky	8,423
Michigan	5,148
Missouri	2,886
Illinois	2,210
Tennessee	242
Total	31,725

In addition, there were built, at Pittsburgh, Pennsylvania, about 60 steamers. We have no means at hand of ascertaining the proportion of the New York tonnage built on the lakes.

The tonnage of the principal ports of the United States was as follows:—

Ports.	Tons. 95ths.	Ports.	Tons. 95ths.
New York	776,491.79	Norfolk, Va.	23,016.26
Boston	296,890.04	Mobile	25,067.79
New Bedford	123,911.57	Buffalo	40,667.34
Bath	88,820.84	Pittsburgh	35,770.63
Portland	84,568.80	Detroit	33,466.94
Philadelphia	188,057.21	St. Louis	32,225.08
Baltimore	134,025.66	Cuyahoga	30,047.11
New Orleans	240,206.24	Oswego	22,151.68
Charleston, S. C.	29,285.48	Chicago	17,832.43
Wilmington, N. C.	10,641.87	Cincinnati	16,897.74

From this it is seen that the registered tonnage of twelve sea-port cities, including New Orleans, is 2,049,477 tons, against 228,585 tons at eight inland cities. Of the latter, 84,922 tons belong to Cincinnati, Pittsburgh, and St. Louis.

The value of some of the principal articles of agriculture and manufactures exported, we compare with the exports of 1849:

Articles.	Values.	
	1848.	1849.
Beef, tallow, hides, and horned cattle	2,474,208	2,058,358
Butter and cheese	1,063,087	1,654,157
Pork, (pickled,) bacon, lard, and live hogs	3,883,884	9,245,885
Wheat	1,681,975	1,756,848
Flour	11,668,669	11,282,582
Indian corn	1,186,663	7,966,369
Indian meal	945,081	1,169,625
Tobacco	8,478,270	5,804,207
Hemp	.....	8,458
Soap, and tallow candles	630,041	627,280
Snuff, and tobacco	695,914	613,034
Iron, pig, bar, and nails	122,225	149,358
Cotton, printed, and colored	380,549	466,574
" white	1,978,031	3,955,117
" nankeen	818,189	3,203
" twist, yarn, and thread	81,313	92,555
All manufactures of cotton	255,799	415,680

The greatest increase, in any article of agriculture, was in the product of the hog. In the exports of cotton goods, the figures show a most satisfactory increase.

In order to show the comparative extent of our commerce with the several nations, we give the total value of the exports to some of the principal countries.

Russia	$937,557	British West Indies	3,935,834
Prussia	34,703	Canada	2,320,323
Sweden and Norway	725,281	France, on the Atlantic	11,646,612
Danish West Indies	727,197	" Mediterranean.	877,147
Hanse Towns	2,710,248	Spain	1,619,423
Holland	2,155,328	Cuba	4,641,145
Belgium	2,443,064	Mexico	1,047,999
England	69,161,992	Brazil	2,838,380
Scotland	3,549,960	Chili	1,722,457
Ireland	3,916,342	China	1,460,945

The value of the exports to England, Ireland, and Scotland exceed, by $20,391,529, the exports to all other countries.

PHILADELPHIA.

The following statement, showing the capital invested in manufacturing, the value of the raw material consumed, the number of hands employed, the wages paid, and the value of the annual product of this branch of industry, in the city and county of Philadelphia, during the year ending June 30th, 1850, is taken from the census returns furnished to A. E. Roberts, Marshal of the Eastern District of Pennsylvania.

Name of Ward or District producing Articles to the Annual Value of $500.	Capital invested in Real and Personal Estate.	Value Raw Material used, including Fuel.	Average number of Hands employed.		Wages.		Value of Annual Product.
			Male.	Female.	Average monthly cost of Male labor.	Average monthly cost of Female labor.	
CITY.							
North Mulberry	$584,400	$301,661	839	194	$18,775	$1,945	$1,066,431
South Mulberry	167,085	157,969	217	119	5,341	1,334	317,930
North	1,340,150	343,177	632	35	17,747	286	1,048,575
Locust	46,295	55,500	119	56	3,004	544	153,900
Middle	1,488,125	1,197,585	1,359	709	37,738	8,167	2,143,025
South	401,650	204,540	486	87	15,833	985	554,300
Lombard	102,300	139,235	307	143	4,750	635	188,021
Spruce	39,450	44,899	61	19	1,623	226	93,900
Cedar	625,400	477,583	540	427	10,689	4,371	798,800
New Market	207,700	301,542	351	117	9,797	1,421	628,841
Pine	164,700	431,899	296	239	7,786	2,986	559,260
Dock	400,400	707,660	636	291	16,520	3,404	1,416,980
Walnut, (incomplete)	.....	.....	.....	.....	.....	.....	.....
Chestnut	2,710,075	3,590,408	4,556	3,528	119,556	39,804	6,606,495
High	1,265,300	1,433,542	2,341	1,152	55,920	10,924	3,236,990
Lower Delaware	1,850,675	1,490,880	2,041	1,626	48,345	14,022	3,308,342
Upper Delaware	371,100	542,723	673	151	18,322	1,417	1,115,250
	.....	.....	.....	.....	.....	.....	.....
NORTHERN LIBERTIES.							
First Ward	$1,231,300	$1,128,393	951	156	$24,494	$1,606	$1,797,800
Second Ward	477,800	604,336	323	54	8,712	896	906,600
Third Ward	677,050	640,616	932	264	25,762	2,929	1,207,350
Fourth Ward	184,400	73,308	288	16	6,664	304	405,200
Fifth Ward	405,906	467,208	818	382	19,471	3,747	1,225,286
Sixth Ward	186,400	196,967	327	49	8,185	379	404,422
Seventh Ward	759,400	653,513	824	261	22,369	2,340	1,126,365
	$3,922,521	$3,764,341	.....	.....	.....	.....	$7,073,023

Name of Ward or District producing Articles to the Annual Value of $500.	Capital invested in Real and Personal Estate.	Value Raw Material used, including Fuel.	Average number of Hands employed.		Wages.		Value of Annual Product.
			Male.	Female.	Average monthly cost of Male labor.	Average monthly cost of Female labor.	
SPRING GARDEN.							
First Ward	$396,900	$467,783	277	102	$2,629	$1,193	$704,595
Second Ward	76,200	185,663	346	120	8,278	1,522	387,255
Third Ward	207,250	233,240	318	146	7,418	1,478	428,627
Fourth Ward	636,695	952,818	1,186	90	21,432	939	1,443,019
Fifth Ward	231,336	188,438	389	43	8,890	384	437,634
Sixth Ward	752,995	578,709	1,138	30	29,490	490	1,038,940
Seventh Ward	612,070	439,565	672	323	15,366	3,532	937,710
	$2,913,445	$3,046,216	.....	.....	.....	.....	$5,376,781
KENSINGTON.							
First Ward	$621,450	$833,403	588	52	$20,593	$542	$1,309,100
Second Ward	533,950	604,716	715	166	16,137	1,345	969,651
Third Ward	501,950	1,321,112	1,297	506	24,357	3,716	1,789,283
Fourth Ward	261,200	975,930	348	166	9,524	1,430	1,304,530
Fifth Ward	692,850	760,907	1,393	66	43,195	495	1,587,273
Sixth Ward	352,300	995,525	1,455	638	26,054	3,815	1,458,557
Seventh Ward	611,811	468,657	515	176	12,660	1,836	1,154,260
Eighth Ward	180,200	205,821	412	120	10,490	100	511,250
	$3,755,711	$6,165,971	.....	.....	.....	.....	$10,083,904
SOUTHWARK.							
First Ward	$108,050	$324,669	264	39	$6,863	$320	$506,730
Second Ward	386,550	385,068	385	12	11,669	120	639,060
Third Ward	106,650	206,520	197	39	5,177	358	326,636
Fourth Ward	39,135	129,039	175	47	4,206	190	213,319
Fifth Ward	1,143,360	811,018	481	11	16,476	130	1,348,613
Sixth Ward	387,320	341,033	587	19	15,630	220	699,472
	$2,171,065	$2,197,347	.....	.....	.....	.....	$3,734,730
MOYAMENSING.							
First Ward	$28,150	$82,655	74	1	$1,835	$120	$122,815
Second Ward	12,050	27,919	42	42	877	504	55,495
Third Ward	121,464	183,919	393	202	5,564	1,885	318,170
Fourth Ward	117,700	104,229	189	22	2,703	210	154,773
Fifth Ward	251,000	176,515	1,329	21	35,889	153	647,948
	$530,364	$575,237	.....	.....	.....	.....	$1,299,201
Passyunk	$4,100	$4,199	20	1	$528	$10	$19,800
Kingsessing	48,400	47,257	74	13	1,868	194	81,260
West Philadelphia	375,650	490,982	400	57	8,768	336	807,530
Blockley	181,600	378,424	286	113	5,104	1,035	511,986
Penn District	1,980,580	185,366	476	62	9,555	648	370,524
North Penn	122,575	105,892	160	48	3,436	625	185,150
Roxborough	199,200	285,001	97	17	1,808	196	393,490
Manayunk, one Ward*	882,400	808,701	691	661	12,686	6,258	1,546,767
Germantown	212,450	642,750	753	508	14,981	3,731	1,068,239
Bristol	154,100	279,342	293	229	1,926	1,678	551,225
Unincorp. N. Liberties.	10,700	62,445	139	.....	3,248	.....	106,740
Frankford Borough	439,450	770,859	725	105	16,676	989	1,080,248
Oxford	151,500	282,400	159	47	3,645	600	391,150
Lower Dublin	199,550	484,955	242	16	6,318	239	610,945
Byberry	48,750	44,943	34	.....	709	.....	380,273
Moreland	1,175	1,018	5	.....	114	.....	2,400
Richmond District	1,383,650	670,564	1,238	28	28,124	255	1,164,937
Bridesburg Borough	290,350	120,230	242	.....	5,856	.....	229,396
Aramingo	105,500	62,878	130	41	2,635	606	135,136
Whitehall	42,650	24,135	112	.....	2,460	.....	52,600
	.....	.....	.....	.....	.....	.....	.....

* Incomplete.

IMPORTATIONS OF COFFEE

Into the United States since the establishment of the Government, inclusive of the fiscal year ending 30th June, 1850.

Years.	Quantity, lbs.	Years.	Quantity.	Value.
			Lbs.	Dollars.
1790	4,150,754			
1791	2,588,970	1821	81,273,650	†4,489,970
1792	4,769,450	1822	25,782,390	5,552,689
1793	11,237,717	1823	37,334,732	7,098,119
1794	6,035,608	1824	30,224,296	5,437,009
1795	14,674,726	1825	45,090,630	5,250,818
1796	*	1826	37,349,497	4,156,558
1797	13,511,877	1827	50,051,986	4,461,391
1798	4,178,321	1828	55,194,697	5,192,835
1799	10,800,482	1829	51,433,538	4,588,585
1800	7,408,196	1830	51,488,242	4,221,021
1801	7,471,396	1831	81,851,386	6,317,666
1802	6,724,220	1832	91,722,329	9,099,864
1803	8,495,260	1833	99,955,000	10,567,299
1804	6,101,191	1834	89,105,366	8,762,637
1805	4,810,274	1835	103,199,777	10,715,466
1806	17,345,188	1836	93,790,507	9,653,053
1807	11,016,419	1837	88,140,403	8,657,760
1808	30,895,495	1838	88,130,720	7,648,217
1809	6,649,293	1839	10,093,992	9,744,103
1810	5,852,082	1840	94,996,065	8,336,222
1811	17,848,393	1841	114,984,783	10,444,782
1812	16,150,176	1842	112,865,027	8,938,638
1813	8,202,072	1843	92,914,557	6,399,189
1814	6,528,233	1844	160,461,943	9,764,554
1815	14,238,319	1845	107,860,911	6,321,271
1816	17,301,018	1846	132,611,596	6,404,958
1817	21,900,104	1847	3,404,622	225,408
1818	19,198,403	1848	150,559,138	8,599,129
1819	20,825,896	1849	165,334,700	9,053,352
1820	13,291,857	1850	144,936,892	11,215,090

* Excess of exports over imports this year.
† Prior to 1821, the amounts are not given on which duties accrued.

HOG STATISTICS.

[From the Louisville Courier.]

We subjoin the following statistics in regard to the product of the hog, which have been accurately and carefully compiled from authentic sources, and will prove serviceable to the mercantile community. It gives the exact number of hogs slaughtered, around Louisville, for the last two years; also, the actual weight of hogs, the weight of lard, and the quantities of pork made, together with the deficiencies and gains, here and elsewhere. The list embraces full returns from Kentucky, Tennessee, and the hogs driven South, and shows a total deficiency of 131,800 hogs, this season.

This table will be valuable for future reference.

	Hogs slaughtered.	Hogs packed.	Average Weight per Hog.	Aggregate Weight, (lbs.)	Aggregate Weight of Lard.	Number of Barrels Pork.
1849–50.						
Adams & Co. (Allen's house)	41,545	41,524	213 56/100	8,852,398	1,732,210	19,755
A. S. White & Co.	34,017	30,924	210 3/6	6,494,040	1,360,680	12,984
Huffman, Maxcy & Sherley.	30,363	26,411	218	5,772,288	775,919	10,863
M. D. Walker	35,600	33,000	207	6,831,000	1,479,213	13,820
McDonald & Day	11,000	11,000	188	2,068,000	352,000	2,815
Clifton, Atkinson & Co.*	66,580	25,000	208	5,200,000	625,000	8,200
Robert Ernst	none.	none.	none.	.....	495,000	none.
Bailey	none.	7,000	175	1,225,000	154,000	none.
	179,105	174,859		36,442,726	6,974,022	68,437
1850–51.						
Jackson, Owsley & Co.	41,752	41,260	195 4/6	8,056,015	1,484,236	14,439
A. S. White & Co.	31,773	30,755	180	5,535,900	1,048,409	10,952
Huffman, Maxcy & Sherley.	24,600	23,783	192 8/100	4,568,238	586,976	8,757
W. Jarvis & Co.	25,691	25,103	194 1/3	4,878,349	975,189	9,102
Brannin, Bacon & Cobb	27,550	26,768	195	5,219,760	927,669	9,541
Clifton, Atkinson & Co.*	25,178	25,178	185	4,657,950	553,816	8,360
McDonald & Day	13,370	13,370	177	2,366,490	361,000	3,681
Key & Garner (estimated)	5,500	5,500	175	962,500	147,500	1,900
Robert Ernst	none.	none.	.....	.....	370,000	none.
	195,414	191,717		36,245,182	6,454,795	66,732

* Number of hogs slaughtered exact, but the product is estimated.

Recapitulation.

Deficiency in hogs driven	69,300
Deficiency in hogs packed in Lower Kentucky and on Tennessee River	61,320
Deficiency in weight, around the Falls, equal to	1,180
Total deficiency in hogs	131,800
Deficiency in barrels of pork, around the Falls	1,705
Deficiency in pounds of lard, around the Falls	519,227
Equal, in barrels, to	2,360

Packing of Lower Kentucky and Tennessee, and Kentucky River.

	1849–50.	1850–51.
Bowling Green and vicinity	15,000	9,000
Clarksville	15,000	6,000
Canton	5,271	1,706
Nashville, Tenn.	13,476	5,382
Gallatin, Tenn.	6,800	895
Woodsonville, Ky.	4,000	1,000
Owensboro', Ky.	3,500	none.
Brandenburgh	2,100	600
Rock Haven	5,300	1,300
Salt River (in flat boats)	6,000	1,200
On Kentucky River	15,000	7,000
	91,447	34,077
	34,077	
Deficiency	57,370	
To which add deficient weight of fully 22 lbs. per hog, equal to, (hogs,)	3,950	
Total deficiency, (hogs,)	61,320	

Comparison of the number of Hogs driven South from Kentucky and Tennessee.

	1849–50.	1850–51.
Through Cumberland Gap	43,000	21,000
Through Asheville, N. C., embracing hogs	81,000	40,000
	124,000	61,000
	61,000	
Deficiency	63,000	
To which add deficiency in weight, equal to	6,300	
Total, (hogs,)	69,300	

IMPORTS AND EXPORTS OF GALENA.

The following is a statement of the imports and exports at this place for the last 4 years:—

Imports.

	1847.	1848.	1849.	1850.
Steamers arrived	268	268	270	332
Lumber	3,251,700	5,611,818	2,820,319	3,514,767
Shingles	2,218,000	3,005,118	3,800,000	3,520,000
Lath	332,000	1,192,000	1,339,000	558,000
Long lumber	36,585	26,576	18,620	28,700
Cord wood	.....	7,988	8,073	4,131

Exports.

	1847.	1848.	1849.	1850.
Lead, pigs	778,469	681,969	626,934	568,300
Copper, casks	70,000	45,823	11,746	.....
Flour, barrels	.....	13,491	20,282	32,733
Wheat, bushels	.....	16,985	15,493	8,000
Hides, number	5,700	7,128	10,162	6,000
Barley, bushels	.....	3,467	11,388	13,450
Oats "	.....	.....	15,756	71,09·
Potatoes "	.....	.....	.....	21,40·
Pork	.....	.....	.....	8,595
Bacon	.....	.....	.....	362,000
Lard	.....	.....	.....	143,180

Office of the Commercial Advertiser, Buffalo, January 15, 1851.

Statement of property first cleared at the Collector's office at Lower Black Rock, on the Erie Canal, during the year 1850; showing the quantity, and average value of each article, and also the whole amount of tolls received at the office, on boats, passengers, and property, during the same period:—

Articles.	Quantity.	Value.
THE FOREST.		
Fur and Peltry, lbs	6,225	$6,225
Product of Wood.		
Boards and Scantling, M ft.	12,844,257	154,131
Shingles, M	311,000	622
Timber, c. ft.	68,919	8,270
Staves, lbs	550,860	1,653
Wood, cords	4,233	8,466
Ashes, Pot and Pearl, bbls	470	11,750
AGRICULTURE.		
Product of Animals.		
Pork, bbls	116	1,160
Beef	1,121	10,089
Bacon, lbs	54,989	3,299
Cheese	617,575	37,054
Butter	116,733	14,008
Lard	7,450	522
Lard Oil, gallons	1,072	1,072
Wool, lbs	98,869	29,660
Vegetable Food.		
Flour, bbls	187,958	845,911
Wheat, bushels	131,916	118,724
Corn	14,363	7,182
Oats	10,818	4,111
Bran and Shipstuff, lbs	2,573,972	20,592
Peas and Beans, bushels	675	675
Potatoes	1,255	628
Dried Fruit, lbs	126,847	7,611
All other Agricultural Products.		
Clover and Grass Seed	11,429	914
MANUFACTURES.		
Domestic Spirits, gallons	14,776	3,694
Beer, bbls	25	125
Oil Meal and Cake, lbs	155,100	1,551
Starch	8,535	854
Leather	49,386	8,889
Furniture	89,143	8,914
Agricultural Implements	900	135
Pig Iron	4,000	60
Machines, and parts thereof	17,600	1,760
Bloom and Bar Iron	90,967	3,184
Iron Ware	1,468	73
Domestic Salt	300	1
MERCHANDISE.		
At 8 Mills, lbs	420	168
Other Merchandise.		
Sugar, lbs	985	79
Nails and Spikes	600	30
Crockery and Glass Ware	5,642	677
Other Articles.		
Live Cattle, Hogs, and Sheep, lbs	1,550	62
Stone, Lime, and Clay	686,404	686
Mineral Coal	8,000	16
Fish	23,808	952
Sundries	840,759	33,630
		Total
Total tons	60,899	value $1,359,869

Tolls.

Boats	$1,476.00
Passengers	1.00
The forest	8,355.00
Agriculture	57,222.00
Manufactures	1,001.37
Total	$68,456.37

Statement of property left at Lower Black Rock, on the Erie Canal, or which was left between that place and the Collector's office next in order on the canal; showing the quantity and average value of each article during the year 1850:—

Articles.	Quantity.	Value.
THE FOREST.		
Product of Wood.		
Boards and Scantling, ft.	100,000	$1,200
Timber, c. ft.	53,176	5,318
Staves, lbs.	1,102,540	1,208
Wood, cords	1,493	2,986
AGRICULTURE.		
Product of Animals.		
Pork, bbls.	12	24
Bacon, lbs.	132	8
Hides	181,002	14,480
Vegetable Food.		
Flour, bbls.	152	684
Wheat, bushels	562,576	506,318
Corn	12,556	6,283
MANUFACTURES.		
Leather, lbs	2,700	486
Furniture	11,965	1,197
Pig Iron	157,461	2,362
Castings	300	15
Bloom and Bar Iron	3,575	143
Domestic Salt	35,420	142
MERCHANDISE.		
At 8 Mills, lbs.	29,552	11,820
Other Merchandise.		
Sugar, lbs.	28,011	2,241
Molasses	13,791	690
Coffee	2,642	264
Nails and Spikes	21,808	1,090
Iron	117,364	1,760
Crockery and Glass Ware	4,386	526
Other Articles.		
Live Cattle, Hogs, and Sheep, lbs.	1,000	40
Stone, Lime, and Clay	3,774,290	3,774
Mineral Coal	160,000	320
Fish	2,180	87
Flint Enamelled Ware	5,602	1,401
Sundries	521,491	20,860
Total tons	25,379	Total value $587,823

Collector's Office, New York,
December 24th, 1850.
ABSALOM BULL, *Collector.*

Lumber Trade.—An English writer, in speaking of the various lumber marts in the world, sets down Albany as one of the most important, if not the largest, on the globe. Of the truth of this remark, we have no means at hand to substantiate the assertion; but, that a very large business has been done here, in lumber, every year since 1836, no one, who is conversant with the trade, will deny. A considerable amount of the lumber sold here has been brought down the Champlain Canal, and entered the Hudson River at West Troy, from whence it is brought down the river in canal-boats, by means of small steam-tugs, which ply between this city and Troy during the season of canal navigation. Nor is lumber the only article which reaches us in that way. Several of the Oswego and Buffalo lines of canal-boats, which have run directly from here to those cities, have ascended and descended the canal at West Troy, so that in no way can an accurate statement be made of the business of this place, except by a resort to the books of the shipping and receiving houses in this city.

The six mill tolls, besides other expenses in the way of towing, is no small item to forwarders, who are compelled, by ruinous competition, to take property frequently at about, or only a fraction over canal tolls.

The best and most costly lumber sold in this market is from the neighborhood of the Genesee Valley and Chemung Canals.

We have prepared the subjoined tables, giving the receipts at tide-water of boards and scantling, timber, shingles, and staves, and their estimated value for the year named. In submitting these tables, we do not pretend to assert that this amount of property has been sold here. We are willing to yield a suitable proportion to our friends up the river; but to give them all that a writer in Hunt's Magazine claimed for them, viz. all that entered the Hudson at West Troy, is more than any forwarding merchant would venture to claim. What we do maintain belongs justly to Albany is the entire receipts of lumber at this place, and at least a third, if not a half, of that coming into the Hudson at West Troy. The figures for the year just closed, show that more than one-half the entire receipts of boards, &c. at tide-water, came to this city by the Erie, while the exhibit of staves show that three-fourths the entire receipts were taken in at this place.

YEARS.	Boards and Scantling, (ft.)	Value.	Timber, (Cubic ft.)	Value.
1836	189,116,847	$3,782,336	1,445,408	$289,181
1837	133,385,757	1,867,400	624,188	81,144
1838	151,114,100	2,191,154	695,600	90,428
1839	141,494,033	2,334,671	801,420	124,311
1840	124,173,383	1,985,774	784,310	156,862
1841	177,720,349	3,021,245	1,028,576	216,000
1842	150,657,900	1,958,552	361,589	65,086
1843	177,402,600	2,749,741	586,013	125,993
1844	140,891,000	2,395,147	917,295	159,373
1845	237,924,666	4,044,720	2,492,668	498,534
1846	260,335,271	4,422,936	1,798,198	251,096
1847	299,078,633	5,078,564	1,613,943	169,160
1848	262,279,116	3,931,277	1,510,777	212,598
1849	297,431,140	4,459,157	1,497,627	119,598
1850	425,095,436	6,365,723	3,080,588	440,490

In glancing over the foregoing figures, which exhibit the trade for the past 15 years, we find that the smallest receipts of boards, &c. was in 1840, and the largest in 1850; and that, compared with the former dates, the business has increased more than threefold. The receipts of timber were the lightest in 1842, and heaviest in 1850.

Years.	Shingles, (M.)	Value.	Staves, (lbs.)	Value.
1836	30,792	$ 92,376	41,033,060	$328,264
1837	59,052	175,182	66,387,990	531,103
1838	47,327	165,644	75,133,400	525,933
1839	46,037	195,657	69,646,234	417,877
1840	55,034	220,136	48,996,000	293,976
1841	46,385	185,540	110,542,839	552,714
1842	36,765	119,486	55,268,500	193,439
1843	62,387	210,244	56,768,700	227,074
1844	77,763	233,289	95,356,100	381,424
1845	72,120	234,390	139,754,800	628,898
1846	69,822	244,378	106,152,500	1,513,532
1847	101,527	405,548	95,104,000	1,239,677
1848	104,270	338,861	114,246,000	514,109
1849	51,258	153,774	154,159,359	693,701
1850	57,905	202,668	202,224,480	908,613

The largest receipt of shingles was in 1848, and the smallest in 1836. The receipts of staves were the smallest in 1836, and the largest in 1850. Since 1847, there is, apparently, a great falling off in their estimated valuation; for, notwithstanding the receipts of the following year were much larger than that named, their estimated value is set down at a sum less by more than one-half the valuation of 1847. It appears, however, that, with the exception of 1846 and 1847, their valuation has been pretty uniform; and probably this apparent discrepancy can be easily explained by those who were then engaged in the trade.—*Albany Evening Journal.*

Doc. No. 32.

SURFACES OF STATES AND TERRITORIES.

Table, showing the Estimate Surface of Territories of the United States North and West of the regularly organized States of the Union, and the portions of territory thereof situated North and South of the parallel of 36 deg. 30 min. north latitude.

Territories.	Sq. miles north of the parallel of 36° 30′.	Sq. miles south of the parallel of 36° 30′.	Total Sq. miles.
Oregon Territory, bounded on the north by the parallel of 49° north latitude, south by the parallel of 42° north latitude, east by the Rocky Mountains, and west by the Pacific Ocean	341,463	.....	341,463
Territory north and west of the Mississippi River, bounded on the north by the parallel of 49° north latitude, east by the Mississippi River, south by the State of Iowa and the Platte River, and west by the Rocky Mountains	723,248	.....	723,248
Wisconsin Territory, bounded east by the Mississippi River, and north by the State of Wisconsin,—being the balance remaining of the old North-west Territory	22,336	.....	22,336
Indian Territory, situated west of the States of Missouri and Arkansas, and south of the Platte or Nebraska River; held and apportioned, in part, for Indian purposes	190,505	58,346	248,851
Territory in Upper California and New Mexico,* situated west of the Rio Grande, to its source, and of a meridian line thence to the parallel of 42° north latitude. Ceded to United States by the treaty with Mexico, of 1848	321,695	204,383	526,078
Total	1,599,247	262,729	1,861,976
* This estimate excludes all that part of Texas which lies outside of its limits, as designated by the yellow shaded lines on Disturnell's Map of Mexico. The part of Texas which lies east of the Rio Grande and west of the Nueces River, from the mouth of the former river up to a line drawn from a point a short distance north of Paso, to the source of the Ensenada River, is estimated at	.....	52,018	52,018
And the part which lies north of Paso and the Ensenada River, up to latitude of 42° north	43,537	81,396	124,933
†Making together	43,537	133,414	176,951

† This estimate, as will be seen, limits our acquisitions of territory from Mexico, by the late treaty, exclusively to those portions of country lying west of the Rio Grande.

Texas in Three Divisions.

	Sq. miles.
1st. Between the Sabine and Nueces Rivers, south of Ensenada River, (Texas proper)	148,569
2d. Between the Nueces and Rio Grande, south of Ensenada River	52,018
3d. North of Paso and the Ensenada River, (Santa Fe county)	124,933
Total	325,520

1st. Number of miles of coast acquired by the annexation of Texas, from the mouth of the Sabine to the Rio Grande	400
2d. Number of miles of coast on the Pacific, including Oregon and California. In California, 970; Oregon, 500; Straits of Juan de Fuca, 150	1,620
Total, including Texas	2,020

Table exhibiting the Areas of the several States and Territories of the United States, in Square Miles and Acres.

	Square Miles.	Acres.
FREE STATES.		
Maine	35,000	22,400,000
Vermont	8,000	5,120,000
New Hampshire	8,030	5,139,000
Massachusetts	7,250	4,640,000
Rhode Island	1,200	768,000
Connecticut	4,750	3,040,000
New York	46,000	29,440,000
New Jersey	6,851	4,384,640
Pennsylvania	47,000	30,080,000
Ohio	39,964	25,576,960
Indiana	33,809	21,637,760
Illinois	55,405	35,459,200
Michigan	56,243	35,995,520
Iowa	50,914	32,584,960
Wisconsin	53,924	34,511,360
Total of the Free States	454,340	290,777,600
SLAVE STATES.		
Delaware	2,120	1,356,800
Maryland	11,000	7,040,000
Virginia	61,352	39,265,280
North Carolina	45,500	29,120,000
South Carolina	28,000	17,920,000
Georgia	58,000	37,120,000
Kentucky	37,680	24,115,200
Tennessee	44,000	28,160,000
Louisiana	46,431	29,715,840
Mississippi	47,147	30,174,080
Alabama	50,722	32,462,080
Missouri	67,380	43,123,200
Arkansas	52,108	33,406,720
Florida	59,268	37,931,520
Total of the Slave States	610,798	390,910,720
Texas	325,520	208,332,800
District of Columbia	50	32,000

Territory North and West of the Mississippi River, and East of the Rocky Mountains.

	Square Miles.	Acres.
Bounded north by 49° north latitude, east by Mississippi River, south by State of Iowa and Platte River, and west by Rocky Mountains	723,248	462,878,720
Indian Territory, situated west of the States of Arkansas and Missouri, and south of the Platte River	248,851	159,264,640
Old Northwest Territory, balance remaining east of the Mississippi River, and north of Wisconsin.	22,336	14,295,040
Total of old Territory organized into States...	*d* 994,435	636,438,400

Territory, exclusive of Old Territory, East of the Rocky Mountains.

	Square Miles.	Acres.	Square Miles.	Acres.
Oregon	341,463	218,536,320	*a* 454,340	299,777,600
California	448,691	287,162,240	*b* 610,798	390,910,720
New Mexico*	77,387	49,527,680	*c* 50	32,060
Texas*	325,520	208,332,800	*d* 994,435	636,438,400
Total	1,193,061	763,559,040	2,059,623	1,318,158,720

* Taking the Rio Grande as the boundary.

Length of the Atlantic coast, to the mouth of St. Mary's River ..... 1,450 miles.
Length of the Atlantic coast from St. Mary's River to Cape of Florida... 450
Length of the Gulf coast to the mouth of Sabine 1,200
Total 3,100

The new States are larger than some of the old ones.

The area of the State of California, according to an estimate made on Preuss's Map, of 1848, is 158,500 square miles.

Estimated surfaces of other States:—

California is about	3½	times larger than	Louisiana	46,431	square miles
"	"	2¼	"	"	Missouri	67,380	"
"	"	4¼	"	"	Kentucky	37,680	"
"	"	2½	"	"	Virginia	61,352	"
"	"	3½	"	"	New York	46,000	"
"	"	3½	"	"	Pennsylvania	47,000	"

The average distance of the seacoast from the eastern boundary of the new State of California, is ..... 212 miles.
Total length, from north to south ..... 764 "
Length of seacoast ..... 970 "

The surface of Utah, estimated on Preuss's map, as follows:—

Part situated in Oregon ..... 20,000 square miles.
Part situated in California Territory ..... 340,000 "
360,000 "
Part within proposed limits of State of California ..... 70,270 "
Total ..... 430,270 "

UNITED STATES CENSUS.....1850.—[OFFICIAL.]

STATE OF NEW YORK.

COUNTIES.	Number of Dwellings.	Number of Families.	WHITE POPULATION.		
			Males.	Females.	Total Whites.
Albany	12,747	17,311	45,534	46,576	92,110
Allegany	6,968	7,297	19,403	18,280	37,683
Broome	5,651	5,840	15,545	14,696	30,241
Cattaraugus	5,750	6,898	20,940	17,908	38,848
Cayuga	9,259	9,978	28,123	26,801	54,924
Chatauque	9,074	9,328	25,820	24,538	50,358
Chemung	5,095	5,206	14,616	13,921	28,537
Chenango	7,572	7,775	19,962	20,089	40,051
Clinton	6,713	7,051	20,547	19,388	39,935
Columbia	6,919	7,683	20,977	20,799	41,776
Cortland	4,580	4,773	12,685	12,418	25,103
Delaware	7,107	7,252	20,264	19,364	39,628
Dutchess	9,564	10,963	28,216	28,806	57,022
Erie	16,118	19,028	51,603	48,611	100,214
Essex	5,320	5,448	16,183	14,915	31,098
Franklin	4,233	4,313	13,195	11,848	25,043
Fulton	3,730	3,794	10,157	9,922	20,079
Genesee	5,014	5,363	14,404	14,012	28,416
Greene	5,748	5,989	16,486	15,746	32,232
Hamilton	407	418	1,208	978	2,186
Herkimer	6,664	6,976	19,557	18,505	38,062
Jefferson	11,927	12,032	34,745	33,226	67,971
Kings	15,808	25,050	65,436	69,461	134,897
Lewis	4,624	4,690	12,442	11,982	24,424
Livingston	7,172	7,373	20,901	19,789	40,690
Madison	8,198	8,438	21,570	21,213	42,783
Monroe	15,037	15,954	44,443	42,530	86,973
Montgomery	5,358	5,711	16,306	15,273	31,579
New York	37,670	93,608	248,118	253,909	502,027
Niagara	7,455	7,559	21,592	20,367	41,959
Oneida	16,754	17,627	50,093	48,820	98,913
Onondaga	15,336	15,879	44,613	40,672	85,285
Orange	9,686	10,372	27,419	27,364	54,783
Ontario	7,868	8,039	22,097	21,321	43,418
Orleans	5,273	5,319	14,624	13,775	28,399
Oswego	11,064	11,352	32,149	29,831	61,980
Otsego	9,084	9,477	24,076	24,405	48,481
Putnam	2,425	2,861	7,094	6,914	14,008
Queens	6,230	6,809	16,813	16,576	33,389
Rensselaer	10,952	13,565	35,782	36,555	72,337
Richmond	2,334	2,481	7,262	7,045	14,307
Rockland	3,011	3,297	8,702	7,666	16,368
St. Lawrence	11,702	11,914	34,997	33,584	68,581
Saratoga	7,892	8,501	22,543	22,523	45,066
Schenectady	3,194	3,421	10,168	9,499	19,667
Scoharie	5,898	5,986	16,706	16,386	33,092
Seneca	4,541	4,728	12,792	12,469	25,261
Steuben	11,210	11,426	33,092	30,317	63,409
Suffolk	6,745	7,414	17,396	17,413	34,809
Sullivan	4,355	4,491	13,281	11,715	24,996
Tioga	4,442	4,529	12,742	11,941	24,683
Tompkins	7,105	7,251	19,360	19,088	38,448
Ulster	10,215	10,794	30,092	27,712	57,804
Warren	2,974	3,290	8,863	8,289	17,152
Washington	8,043	8,317	22,638	21,764	44,402
Wayne	8,074	8,381	22,870	21,831	44,701
Westchester	8,754	10,386	29,028	27,188	56,216
Wyoming	5,718	6,017	16,201	15,734	31,935
Yates	3,784	3,936	10,432	10,010	20,442
Total	472,151	566,959	1,544,903	1,504,278	3,049,181

STATE OF NEW YORK.—[*Continued.*]

Counties.	Free colored.			Total Free Population.	Number of		
	Males.	Females.	Total Free Colored.		Deaths.	Farms.	Productive Establishments.
Albany	537	632	1,169	93,279	1,710	2,841	395
Alleghany	68	57	125	37,808	863	3,178	291
Broome	211	208	419	30,660	295	2,497	229
Cattaraugus	46	56	102	38,950	412	3,755	299
Cayuga	287	247	534	55,458	736	4,228	507
Chatauque	71	64	135	50,493	593	5,163	510
Chemung	148	136	284	28,821	468	2,134	350
Chenango	122	138	260	40,311	542	4,471	565
Clinton	67	45	112	40,047	439	2,095	459
Columbia	596	701	1,297	43,073	526	2,512	210
Cortland	18	19	37	25,140	326	2,465	202
Delaware	110	96	206	39,834	333	4,747	433
Dutchess	935	1,035	1,970	58,992	1,185	3,208	415
Erie	405	374	779	100,993	2,160	4,880	698
Essex	35	15	50	31,148	203	1,873	199
Franklin	30	29	59	25,102	205	1,667	129
Fulton	39	53	92	20,171	174	1,361	238
Genesee	34	38	72	28,488	331	2,574	199
Greene	440	454	894	33,126	382	2,672	433
Hamilton	2		2	2,188	18	261	17
Herkimer	93	89	182	38,244	386	2,723	277
Jefferson	90	92	182	68,153	572	5,590	630
Kings	1,925	2,059	3,984	138,881	2,892	363	576
Lewis	25	15	40	24,464	146	2,374	77
Livingston	106	79	185	40,875	459	2,503	363
Madison	135	154	289	43,072	548	3,845	405
Monroe	328	349	677	87,650	1,995	4,123	526
Montgomery	218	195	413	31,992	321	1,883	267
New York	5,988	7,532	13,520	515,547	11,894	168	3,367
Niagara	164	137	301	42,260	482	3,074	336
Oneida	329	324	653	99,566	1,029	6,292	952
Onondaga	300	305	605	85,890	1,131	4,594	1,410
Orange	1,187	1,175	2,362	57,145	633	3,426	357
Ontario	230	269	499	43,917	433	3,059	205
Orleans	51	51	102	28,501	287	2,271	232
Oswego	109	109	218	62,198	830	4,497	640
Otsego	67	90	157	48,638	591	4,764	330
Putnam	75	55	130	14,138	289	989	89
Queens	1,694	1,750	3,444	36,833	374	2,303	89
Rensselaer	482	544	1,026	73,363	974	2,929	639
Richmond	307	279	586	14,893	939	212	37
Rockland	291	303	594	16,962	249	682	144
St. Lawrence	19	17	36	68,617	689	6,134	456
Saratoga	266	314	580	45,646	627	3,465	349
Schenectady	174	213	387	20,054	229	1,020	107
Schoharie	240	216	456	33,548	345	2,439	231
Seneca	85	95	180	25,441	311	1,555	240
Steuben	176	186	362	63,771	627	5,797	576
Suffolk	1,059	1,054	2,113	36,922	643	2,323	96
Sullivan	56	36	92	25,088	258	1,889	360
Tioga	104	93	197	24,880	215	2,026	354
Tompkins	160	138	298	38,746	394	3,194	484
Ulster	739	842	1,581	59,385	949	3,543	498
Warren	16	30	46	17,198	184	1,505	128
Washington	170	178	348	44,750	491	3,037	270
Wayne	113	139	252	44,953	485	3,957	250
Westchester	1,089	956	2,045	58,261	820	2,585	396
Wyoming	28	18	46	31,981	356	3,360	299
Yates	76	72	148	20,590	223	1,673	165
Total	22,965	24,949	47,914	3,097,095	46,651	170,698	23,985

STATE OF NEW YORK.—RECAPITULATION.

Dwellings in the State		472,151
Families in the State		566,959
White Males	1,544,903	
White Females	1,504,278	
Total Whites		3,049,181
Free Colored Males	22,965	
Free Colored Females	24,949	
Total Colored		47,914
Aggregate Population		3,097,095
Deaths during the year		46,651
Farms in cultivation		170,698
Manufacturing establishments producing $500 and upwards		23,985

STATE OF DELAWARE.

Counties.	Census of 1840.					Census of 1850.						
	Free Whites.	Free Colored.	Total Free Population.	Slaves.	Total Population.	Free Whites.	Free Colored.	Total Free Population.	Slaves.	Total Population.	Fugitives.	Manumitted.
Kent	13,618	5,827	19,445	427	19,872	16,119	6,350	22,469	347	22,816	7	...
New Castle	25,806	6,773	32,579	541	33,120	34,815	7,568	42,383	394	42,777	5	33
Sussex	19,137	4,319	23,456	1,637	25,093	20,348	4,039	24,387	1,548	25,935	7	141
Total	58,561	16,919	75,480	2,605	78,085	71,282	17,957	89,239	2,289	91,528	19	174

Representative population		90,612
Free Colored Males	705	
Free Colored Females	620	
Total Colored		1,325
Aggregate population		583,088
Deaths during the year		7,545
Farms in cultivation		46,760
Manufacturing establishments producing $500 and upwards		3,682

Counties.	Number of Dwellings.	Number of Families.	Free Whites.			Free Colored.			Total Free Inhabitants.	Slaves.	Deaths.	Farms.	Productive Establishments.	Fugitives.	Manumitted.
			Males.	Females.	Total Whites.	Males.	Females.	Tot. Free Colored.							
Allegany	3,850	3,902	11,545	10,088	21,633	186	226	412	22,045	724	150	892	24	4	2
Anne Arundel	3,712	3,745	8,314	8,228	16,542	2,338	2,264	4,602	21,144	11,249	496	1,295	156	...	...
Baltimore City	23,980	28,635	71,109	70,082	141,171	10,632	14,305	24,937	166,108	2,946	3,630	28	2,430	8	4
Baltimore County	6,085	6,290	17,239	16,948	34,187	1,801	1,832	3,633	37,820	3,772	617	1,627	139	26	27
Calvert	1,006	1,006	1,866	1,764	3,630	732	798	1,530	5,160	4,486	91	434	.....	...	1
Caroline	1,526	1,526	3,029	3,009	6,096	1,378	1,410	2,788	8,884	808	76	730	.....	...	2
Carroll	3,476	3,593	9,434	9,233	18,667	476	498	974	19,641	975	168	1,387	124	...	1
Charles	1,335	1,335	2,829	2,836	5,665	455	458	913	6,578	9,584	293	709	.....	6	2
Cecil	3,056	3,114	7,951	7,521	15,472	1,369	1,254	2,623	18,095	844	227	1,208	176	...	...
Dorchester	2,705	2,709	5,450	5,338	10,788	1,832	1,975	3,807	14,595	4,282	187	1,049	12	30	...
Frederick	6,397	6,614	16,529	16,785	33,314	1,824	1,936	3,760	37,074	3,913	576	1,983	248	37	18
Harford	2,977	2,985	7,384	7,029	14,413	1,427	1,350	2,777	17,190	2,166	246	1,278	72	33	34
Kent	1,584	1,584	2,930	2,686	5,616	572	1,571	3,143	8,759	2,627	127	667	35	10	2
Montgomery	1,923	1,960	4,758	4,677	9,435	632	679	1,311	10,746	5,114	287	1,051	71	6	...
Prince George's	1,875	1,875	4,457	4,444	8,901	554	585	1,139	10,040	11,510	450	885	28	14	2
Queen Anne's	1,864	1,864	3,635	3,405	7,040	1,538	1,636	3,174	10,214	4,270	324	936	29	30	5
Somerset	3,158	3,158	6,655	6,730	13,385	1,741	1,742	3,483	16,868	5,588	526	1,485	76	...	...
St. Mary's	1,512	1,646	3,100	3,125	6,225	807	824	1,631	7,856	5,842	275	813	9	...	...
Talbot	1,751	1,776	3,578	3,502	7,080	1,278	1,319	2,597	9,677	4,134	240	793	35	22	7
Washington	5,052	5,182	13,467	13,462	26,929	855	974	1,829	28,758	2,090	362	1,292	170	15	...
Worcester	2,884	2,885	6,238	6,163	12,401	1,487	1,527	3,014	15,415	3,444	246	1,318	29	...	...
Total	81,708	87,384	211,495	207,095	418,590	34,914	39,163	74,077	492,667	90,368	9,594	21,860	3,863	215	135

Recapitulation.

Dwellings in the State		81,708
Families in the State		87,384
White Males	211,495	
White Females	207,095	
Total Whites		418,590
Free Colored Males	34,914	
Free Colored Females	39,163	
Slaves	90,368	
Total Colored		164,445
Aggregate population		583,035

Deaths in the year	9,594
Farms	21,860
Manufacturing establishments producing $500 and upwards	3,863
Slaves run away during the year	215
Slaves manumitted during the year	135

Counties.	Dwelling-houses.	Families.	White.		Free colored.		Total.	Deaths.	Farms.	Manufacturing Establishments.
			Males.	Females.	Males.	Females.				
Aroostook	2,038	2,045	6,725	5,804	3	3	12,535	114	1,228	59
Cumberland	12,762	15,285	39,226	39,730	296	297	79,549	1,362	5,352	644
Franklin	3,487	3,690	10,220	9,787	13	7	20,027	207	2,521	135
Hancock	5,550	5,839	17,762	16,581	16	13	34,372	329	2,271	205
Kennebec	10,162	11,226	31,359	31,020	81	61	62,521	812	5,256	331
Lincoln	12,176	13,120	38,537	36,079	139	120	74,875	969	4,975	526
Oxford	6,712	7,148	20,434	19,224	3	2	39,663	412	4,288	150
Penobscot	10,374	10,849	32,847	30,179	36	27	63,089	770	3,983	407
Piscataquis	2,589	2,634	7,802	6,980	2	1	14,785	162	1,779	61
Somerset	5,917	6,209	18,479	17,098	2	2	35,581	385	3,813	155
Waldo	7,631	8,272	24,167	23,024	23	16	47,230	608	4,415	347
Washington	5,835	6,374	19,926	18,758	71	55	38,810	477	1,875	310
York	10,564	11,096	29,151	30,914	20	16	60,101	938	5,004	352
Total	95,797	103,787	296,635	285,128	705	620	583,088	7,545	46,760	8,682

Recapitulation.

Dwelling-houses in the State		95,797
Families in the State		103,787
White males	296,635	
White females	285,128	
		581,763
Free colored males	705	
Free colored females	620	
		1,325
Total population		583,088
Deaths during the year		7,545
Farms in cultivation		46,760
Manufacturing establishments producing $500 and upwards, annually		3,682

NEW MEXICO.

THE ages of the free inhabitants of New Mexico, as ascertained by the census, having been classified, we give below a table, showing the number in each county over 80 years of age. These facts prove the health of this Territory to be as good, if not better, than that of any other country in the world; and are interesting, as showing the extraordinary longevity to which many of the inhabitants have attained.

In Valencia county, Candelario Agular, a farmer, was 130 years old when the census was taken; Jose Ortado was 110; Rosa Billejos, 110; Rose Montallo, 106; Maria J. Pacheco, 103. The males seem to attain a greater age than the females, in proportion to their number.

COUNTIES.	Persons over 80 years of age.			Persons over 90 years of age.			Persons over 100 years of age.		
	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
Rio Arriba	35	22	57	12	5	17	2	5	7
San Miguel	26	16	42	12	2	14	5	4	9
Valencia	47	31	78	8	7	15	8	10	18
Santa Anna	17	4	21	4	3	7	...	...	...
Taos	35	12	47	14	2	16	2	...	2
Bernalillo	22	14	36	7	3	10	...	1	1
Santa Fé	15	18	33	5	6	11	...	3	3
Total	197	117	314	62	28	90	17	23	40

All which is respectfully submitted.

THOMAS EWBANK,
Commissioner of Patents.

APPENDIX.

Westfield, Chatauque County, N.Y., August 20th, 1851.

Hon. THOMAS EWBANK:

Dear Sir:—In compliance with your request, I send you, herewith, a description of my recently imported sheep.

They are pure Merinos, were bred in France, and were selected from the best flocks by John A. Taintor, Esq., of Hartford, Connecticut, a gentleman widely known for his enterprise, liberality, and public spirit, in introducing into this country the choicest specimens of imported stock.

These sheep are of unusual size, and possess, to a remarkable degree, all the qualities to be desired in sheep, for mutton as well as for wool-growing purposes. From the nose to their feet, they are completely covered with a long, thick, and fine staple of wool, and they yield enormous fleeces, the ewes usually shearing from 15 to 20 pounds each of clear, unwashed wool; and I have known them to shear as high as 25 pounds each. The rams shear proportionably larger fleeces. Many of these sheep are encircled with large folds of loose skin around their necks and shoulders, giving them greater surface for the growth of wool. They have strong and hardy constitutions, are very prolific, and, as the ewes are excellent nurses, there is no difficulty in raising their lambs. I have never failed of raising more lambs than I have had ewes.

The sheep represented in the accompanying engraving were taken from life by R. H. Pease, Esq., of Albany, and are very correct likenesses of the animals.

Respectfully yours,
JOHN D. PATTERSON.

Clatsop Plains, mouth Columbia River, Oregon Territory, December 16th, 1850.

Dear Sir:—Having resided on these Plains for upwards of four years, and a cultivator of the land for my occupation, I can speak with a knowledge of the products of this section of the world, as far as my observations have extended. In reference to the dairy business, the average yearly product of butter per cow is estimated at 96 pounds. Cheese, double that amount. Comparative cost per pound for making, 6 cents. Mode of churning, with the common churn. Average price of butter per pound, $1; cheese, 75 cents.

Neat Cattle.—Cost of rearing till 3 years old, is what they gather from the range themselves; scarcely fed any in winter; usual price at 3 years old, if sold for beef, is from 16 to 25 cents per pound. Value of good dairy-cows, $75 at any season of the year; we have but a few of the most approved breed of cattle.

Turnips—Are raised here to great perfection. This year's crop, in manured ground, 300 bushels per acre of the common flat turnip, larger, in general, than any I ever saw raised in the States. The common weight of a turnip is from 10 to 15 pounds, some larger and some smaller.

Carrots and Beets.—The cultivation of these roots as a field crop is on the increase. The yield is usually good.

Irish Potatoes.—Average yield per acre, (manured ground,) 400 bushels. Cost of production per bushel, 10 cents. Most prolific and profitable, the kidney and common blue. Average price per bushel, (wholesale,) $2.75.

The cultivation of fruit-trees is receiving increasing attention.

The above prices may seem to be high, but owing to our section of country being so nigh the mining country, every thing that can be raised is in ready demand, and at a high rate.

Very respectfully, yours, &c.

O. C. MOTLEY.

Hon. THOMAS EWBANK, *Commissioner.*

THE MOUNT AIRY AGRICULTURAL INSTITUTE.

BY JOHN WILKINSON, PRINCIPAL.

December, 1850.

This institution has now been in operation about 6 years, and its patronage has been gradually increasing, the students now numbering 32. The object of it is to combine science with judicious practice in agriculture, and to instruct its pupils in all the mysteries thereof. There are connected with the Institute about 70 acres of land, quite various in its natural characteristics, which is well adapted to the purposes of an agricultural seminary.

It is accessible several times a day from Philadelphia, by stage and railroad.

The tuition year is divided into two terms, of five months each; the summer term commencing on the first Thursday of April; the winter term on the first Thursday of October.

The charge per term is $100, payable in advance half-yearly.

The *practical course* consists of instruction in the practice and principles of agriculture, and the rotation of crops; the best modern modes of tillage; rearing, selecting, and feeding live stock; breaking and training horses and oxen; slaughtering and curing meats; horticulture, forestry, and floriculture; fencing, road-making, levelling, grading, seeding, and laying out ornamental grounds; the application of steam and other motive power; the construction and use of farm machinery, implements, &c. &c. A portion of every day is spent in the practical operations of the farm; the balance in the literary department, which consists of the following collateral branches, viz:—The natural sciences, as applied to agriculture; the classics, and modern

languages. Each student is required to lecture upon the science he is pursuing, to make surveys, with plots of the same, and also to keep a replete journal or diary of all experiments and farm operations. Two evenings of the week are spent in the discussion of practical subjects, on which full notes are preserved for reference. I now feel that I am no longer conducting an experiment, founded on the quicksands of contingency, but, stimulated by the happy results that have thus far attended my efforts, I procced with promptitude and confidence towards the goal.

I anxiously look forward to the day when a thorough course of instruction in scientific and practical agriculture shall be considered an indispensable collateral branch of the classical course, preparatory to any of the learned professions.

My experience has proved to me that the addition of this branch to the common collegiate course will, while it adds but little to the time requisite to complete the diplomatic course, add very much to the health and happiness of the student, and greatly facilitate his progress, by insuring a vigorous, well-disciplined mind, which is the natural and happy result of proper moral and physical culture.

Besides this very desirable consequence of combining the agricultural with the literary course, are many others, no less important, among which is the advantage of a knowledge of this standard pursuit, to which the unfortunate or unsuccessful in other professions may resort to as a reliable support. So far from detracting from or interfering with the progress of the student in his literary pursuits, it, on the contrary, greatly facilitates his progress, by alternating the confining, feverish monotony of the class-room with the delightful and invigorating exercises of the field, garden, stable, and workshop, from which he returns with clearness and accuracy to master the most difficult mathematical solutions, or investigate and follow out the deep, complicated, and mysterious principles of science.

JOHN WILKINSON.

THE END.

STEREOTYPED BY L. JOHNSON AND CO.
PHILADELPHIA.